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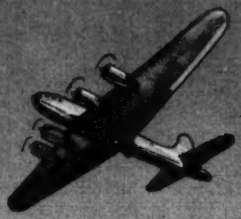

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A MONTHLY REVIEW OF MILITARY LITERATURE

MILITARY REVIEW

ENGLISH EDITION

Starting with the April 1945 issue, the Command and General Staff School broadened its scope by publishing the MILITARY REVIEW in three languages, namely English, Spanish, and Portuguese.

The articles that appear in the Spanish-American and in the Brazilian editions will be found that' same month in the English edition.

This notice is to acquaint our readers with the fact and to insure our Spanish-American and Brazilian neighbors that it will be our most sincere endeavor to translate the English text faithfully, and to produce, to the best of our ability, a magazine that is authoritative, informative, interesting and instructive.

The Editors

EDICION HISPANOAMERICANA

Con el número del mes de abril de 1945, la Escuela de Comando y Estado Mayor amplió sus actividades con la publicación de la MILITARY REVIEW en tres idiomas: español, portugués e inglés.

Los artículos que se publican en las ediciones hispanoamericana y brasileña aparecerán en la edición norteamericana del mismo mes.

Por medio de estas líneas, deseamos hacérselo saber a nuestros lectores y, asegurarles a nuestros vecinos de Hispanoamérica y del Brasil, que dedicaremos nuestro más sincero esfuerzo a traducir con exactitud la versión inglesa y a presentar, de acuerdo con los medios a nuestro alcance, una revista autoritativa, informativa, interesante e instructiva.

La Redacción

EDIÇÃO BRASILEIRA

Com o número do mês de Abril de 1945, a Escola de Comando e Estado Maior estendeu seus horizontes com a publicação da MILITARY REVIEW em três idiomas, o português, o espanhol e o inglês.

Os artigos publicados nas edições brasileira e hispano-americana aparecerão tambem na edição em inglês do mesmo mês.

Êste aviso tem em vista dar conhecimento dêste fato aos nossos leitores e assegurar aos nossos vizinhos brasileiros e hispano-americanos que serão envidados sinceros esforços na tradução do inglês, para apresentar-lhes com os meios ao nosso alcance, uma revista fidedigna, informativa, interessante e instrutiva.

A Redação

VOLUME XXV JUNE 1945 NUMBER 3

MILITARY REVIEW

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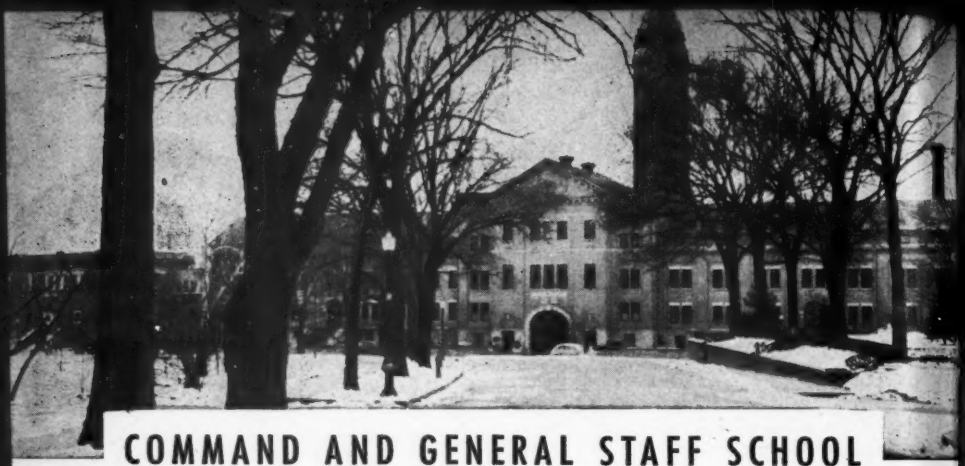

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An Operation of the 3d Armored ("Spearhead") Division

MAJOR GENERAL MAURICE ROSE
Commanding General, 3d Armored ("Spearhead") Division

This article is of particular interest in view of the fact that it presents a problem in changing direction by an armored division after it had been definitely committed in one direction and while a part of the division was in contact with the enemy. In his letter submitting the manuscript, the author states that all orders for breaking contact and changing direction were issued orally, and no written data, including overlays or operation map, were found to be necessary.—THE EDITOR.

THE tactical doctrine of the United States Army embodies teachings which caution commanders and staffs against several types of operations. Fortunately this doctrine has not become dogma, for, on occasions, it becomes expedient and necessary to execute certain of these operations. At times the expediency is dictated by a command decision, wherein tactical details are subordinated to the broader strategic perspective. At other times, there is little or no choice afforded the commander, who must accomplish his mission with the forces he has regardless of the type of operation involved. This article proposes to present one case in point taken from the combat experiences of the 3d Armored Division in France and Belgium.

In order to set this story in its proper time-and-space framework it is well to review briefly the sequence of events leading to the operation with which we are concerned.

While the German Seventh Army was being pummeled to ineffective fragments by the U.S. First Army in the Falaise-Argentan area, the armor of the U.S. Third Army was running almost at will over western France, and by long hops had reached the Seine River south of Paris.

With the mopping up of the Ranes-Fromentel area, the 3d Armored ("Spearhead") Division completed its part in the Falaise Gap operation on 19 August 1944. Then, after a two-day period of maintenance and refitting, the division moved, without opposition, through Chartres to the vicinity of Corbeil and Melun, arriving on 24 August 1944, and prepared to cross the Seine River. When the 1st and 9th Infantry Divisions closed into assembly areas nearby, the U.S. VII Corps was poised and ready to begin the pursuit that carried from the Seine River to the Siegfried Line in eighteen days.

Spearheading this historic drive, the 3d Armored Division crossed the Seine River at Tilly and just south of Corbeil on 26 August 1944. Spreading into multiple columns, the division pushed through the shell that the enemy was holding stubbornly around the 4th Infantry Division's bridgehead east of the Seine, and moved swiftly to the east and northeast. The enemy was withdrawing too rapidly to offer strong resistance, but was found on all routes holding road blocks at all favorable points. He opened fire on the armored columns from concealed positions only to find himself quickly overrun or bypassed, contained, and left to be dealt with by the closely following infantry. Parts of the 48th German Infantry Division, the 9th Panzer Division, and an extensive assortment of other enemy troops were encountered. Several enemy columns were overtaken moving in the direction of the 3d Armored's advance. These columns were engaged, and as a result never reached the predesignated assembly areas of their battered units.

Initially, elements of the 4th Cavalry Group combed a broad front with a reconnaissance screen out in the lead, the 1st and 9th Infantry Divisions followed the 3d Armored to liquidate pockets of bypassed enemy resistance and to consolidate the gains. Soon, the task force columns of the 3d Armored, each consisting of a reinforced tank battalion, overtook the reconnaissance elements, and it became apparent that the

enemy could not hold, and had no intention of trying to hold, a consolidated defensive line. Whereupon, the cavalry elements sideslipped to the north and south and continued to screen the flanks of the corps' advance. The armored columns moved on at maximum speed, and the 1st and 9th Infantry Divisions followed the "Spearhead" generally abreast of each other, the 1st Division on the left.

On 27 August the 3d Armored ("Spearhead") Division reached the Marne River at La Ferté-sous-Jouarre where both combat commands crossed on existing bridges which were repaired and strengthened by division engineer troops. There was brief fighting for Meaux and Coulommiers. When resistance in these towns was reduced, Combat Command A and Combat Command B started moving again in task force columns toward their respective objectives of Pontarcy and Soissons to seize and secure the crossings of the Aisne River at those locations (see sketch).

Driving at such speed soon brought the 3d Armored into the heart of the enemy's communications zone, where the remnants of enemy combat troops fought in isolated and disorganized groups while other troops attempted to extricate valuable dumps and depots. Near Soissons and Braisne, elements of the division destroyed three railway trains which were evacuating personnel and equipment to move east. Tankers of one armored regiment engaged and destroyed four enemy tanks which were loaded on flat cars and manned by their crews. The attached antiaircraft artillery battalion stopped one of these trains and raked the troop cars with their multiple .50-caliber machine guns. The countryside was littered with all types of equipment, cosmetics, clothing, and wine bottles, abandoned by the loot-laden German soldiers in their panic.

Passage through the towns and villages, so quickly evacuated by the Wehrmacht, was slowed markedly by milling crowds who swarmed on and about the vehicles in delirious exhibitions of their happiness.

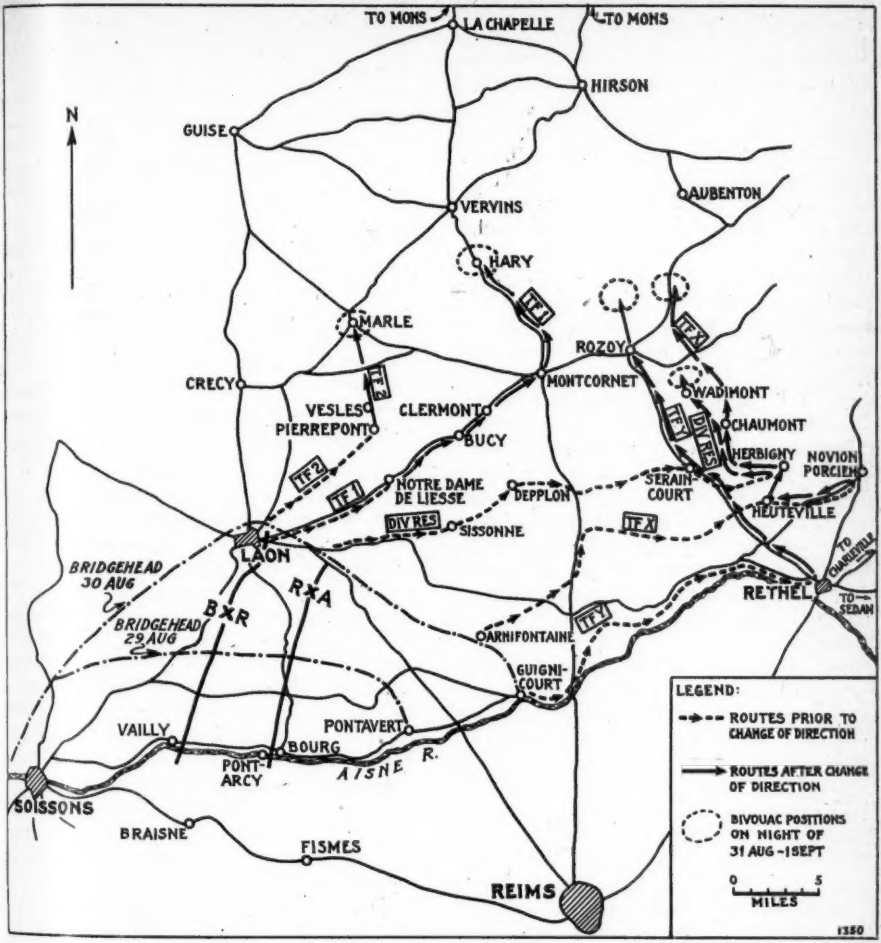
On 28 August the Aisne River crossings at both Soissons and Pontarcy were seized intact. (The main highway bridge was destroyed by the enemy, but others to the east were intact.) A few mines had to be lifted from the approaches and the existing spans strengthened. There was increased enemy resistance along the Aisne. In addition to his small arms and mortars, the German used a few self-propelled and other antitank guns as artillery. In general, the indirect fire of these weapons was inaccurate.

The Aisne bridgehead was expanded and secured on 29-30 August by first seizing the high ground north of the river and then pushing out to the northeast to the line shown on the sketch.

In the left of the division sector on the high ground just across the river from Soissons there were extensive reinforced concrete fortifications. A considerable amount of detailed information concerning these fortifications was furnished by the FFI (Free French of Interior) troops in the area. However, anticipated trouble did not develop. The enemy was not given time to occupy and defend them.

Troops of the 3d Armored ("Spearhead") Division securing Soissons and the river crossings were relieved of these duties early on the morning of 30 August by infantry elements that had come up during the night, but even with this increase in available fighting strength, the 3d Armored ("Spearhead") Division had a rather broad front to cover in securing the proposed bridgehead line. Accordingly, the Division Reserve was committed between Combat Command A and Combat Command B. The bridgehead line was seized on 30 August 1944 and firmly held. The armored reconnaissance battalion patrolled the principal road nets within the zone to keep the small isolated enemy groups from disrupting communications.

Without waiting to be relieved on the bridgehead line by the infantry divisions who were following, the 3d Armored ("Spearhead") Division was assembled in preparation for another push to its new objective, Sedan and Charleville. Five routes (see sketch) were assigned for this advance, which began on the morning of 31 August 1944.



The composition of the columns that started for Charleville and Sedan on 31 August were:

Combat Command A

32d Armd Regt
1st Bn, 36th Armd Inf Regt
Co A, 23d Armd Engr Bn
Co A, 703d TD Bn
Co A, 45th Armd Med Bn
Det Co B, Maint Bn, 3d A. D.
67th Armd FA Bn
54th Armd FA Bn

Combat Command B

33d Armd Regt (-3d Bn)
2d Bn, 36th Armd Inf Regt
Co D, 23d Armd Engr Bn
Co B, 703d TD Bn
Det Co C, Maint Bn, 3d A. D.
391st Armd FA Bn
87th FA Bn

Division Reserve

36th Armd Inf Regt (-1st & 2d Bns)
3d Bn, 33d Armd Regt
703d TD Bn (-A and B Cos)
23d Armd Engr Bn (-A and D Cos)
Co C, 45th Armd Med Bn
Det Co A, Maint Bn, 3d A. D.
991st Armd FA Bn (155 Gun)
183d FA Bn (155 How)

Combat Commands A and B each moved in

two columns. Division Reserve moved on the center route in a single column.

As on previous occasions, the enemy used the hours of darkness, while the 3d Armored was halted, to build up a thin screen of resistance with the mission of delaying the advance of the American armor. When the attack started on the morning of 31 August, this initial resistance was quickly overcome and a rapid advance was made throughout the morning.

The reconnaissance battalion advanced in front of the division, covering the entire zone and utilizing the road net to the maximum extent possible. They encountered slight resistance all along the front, much of which they reported and bypassed; even so, the prisoners they took constituted a problem.

Combat Command A crossed their line of departure at 0930 hours and moved rapidly.

Combat Command B was delayed in starting their attack because of having to assemble troops from positions held on the bridgehead line. (This circumstance later proved to be fortunate.) Their attack started at 1224, and moved initially against light resistance.

By 1300 hours the five columns had encountered resistance, and leading elements of the four columns of Combat Commands A and B were engaged with the enemy. Then, at 1315, a staff officer from VII Corps arrived at the command post of the 3d Armored Division near Laon. He had flown from corps headquarters located at La Rue with instructions to change the direction of attack from east to north. The new objective assigned the 3d Armored was to secure Mons. New routes of advance were through Hirson and Vervins.

A message was sent by radio from the division command post directing the advancing columns to halt, coil off the roads, and wait further orders. Also, information concerning the change in attack plans was relayed by voice radio to the Division Commander, who was with leading elements of the division near Seraincourt. A staff officer went forward immediately with detailed information concerning the change in plans to join the Division Commander. Combat commanders were also given orders by voice radio to join the Division Commander at Seraincourt.

A meeting of the above column commanders and staff officers was accomplished, and oral orders were given by the Division Commander at 1430 hours, directing a change in routes of advance for the columns, with a change in mission for the division.

When orders directing a change in mission and the route of advance were received by Task Force X of Combat Command A, this force was heavily engaged by the enemy in the vicinity of Novion Porcien. A successful disengagement from the enemy was accomplished by this force, a column reformed, and their route retraced to Hauteville, where a change in direction to the north was made.

Task Force Y of Combat Command A was fighting German rearguard forces just west of the village of Rethel, when orders were received directing the change in route of advance. The column turned northwest on the Rethel-Rozoy road with little or no resistance from the enemy, a complete disengagement with the enemy being accomplished by the change in the route of advance. By dark the forces of Combat Command A had advanced to locations approximately three miles north and northeast of Rozoy, where they bivouacked for the night.

Combat Command B columns, due to a late start on the morning of 31 August 1944, had only reached the towns of Pierrepont and Notre Dame de Liesse even though resistance was light. Their mission had been to protect the left flank of the division while advancing toward Charleville and secure the town of Vervins as an intermediate objective for the day. Consequently, when the order changing the mission for the division was received, no change in direction of the routes of Combat Command B had to be made. By dark the columns of Combat Comand B had reached Marle and Hary where they bivouacked for the night.

The Division Reserve, moving in a single column and between Combat Commands A and B, received orders to halt their advance

to the east, coil forward with the rear of their column, and wait orders. This halt was made in a wooded area just west of Herbigny. After receipt of orders directing their route of advance be turned north, they proceeded along the secondary road toward Chaumont and Wadimont with an assigned mission of securing Hirson. A well-defended road block stopped the advance of the column just north of Wadimont. This block was not reduced prior to dark, so the Division Reserve bivouacked for the night at this location.

When night came the combat commands and Division Reserve were again in contact with even stronger enemy forces than those met during the morning, but had made good progress toward the new objective.

The division's reconnaissance battalion, moving north from the farthest points of advance toward Sedan and Verdun, provided a screen on the right flank of the division. They moved in multiple columns on the secondary road net.

When the advance continued north on 1 September 1944, enemy resistance became more stubborn along the entire front. Combat Command A fought its way to Avesnes, while Combat Command B pushed through Vervins and La Chapelle, reaching a position directly west of Avesnes. Division Reserve reached and held Hirson.

On the following day the attack continued with Division Reserve moving on the right flank in two columns. By 1900 hours, Combat Command A had reached Mons, and a little later Combat Command B and Division Reserve reached their objectives on the western and eastern sides of the city. A system of road blocks was established on all routes leading through Mons that night. Enemy pressure from west to east became stronger. The successful change in direction of attack of the 3d Armored ("Spearhead") Division and the speed of execution of this maneuver placed this division directly across the escape route of a retreating German army. The Battle of Mons for World War II had begun.

Portrait by the Enemy

From *Air Force* February 1945.

JAPANESE Imperial Army Headquarters recently ordered field commanders to give their opinions of American fighting ability.

One Jap commander reported: "The American understands machinery and is adroit at handling it. Speed characterizes his construction of airfields, motor roads, and communication networks, and also his strengthening of positions. His strong air forces execute day and night attacks."

Another observed: "The basis of the tactics of the U.S. Army may be said to be a belief in the almighty power of materialistic fighting strength. Although Americans are not adept at military deception and subterfuge, their leadership is extremely reliable and their spirit in the offensive should not be treated lightly. In an offensive the customary tactics of the U.S. Army are to cut supply lines, isolate strategic key points and, by concentrating air and ground strength, exhaust and eventually capture these points. It has been established that the enemy is capable of altering his tactics quickly."

And another: "Against his admitted military assets, we must set down the decided weaknesses of the American soldier. He depends too much upon his material power and is deficient in spiritual strength. The men's sense of personal responsibility is not consistently high and there are many flaws in their security measures. U.S. forces, who place all faith in fire power, are weak in hand-to-hand combat. In this respect they certainly are not to be feared. We must guard against making headlong and reckless advances, however, even when we are achieving success in hand-to-hand combat . . .U.S. fighters are noisy, and a security-conscious soldier is the exception rather than the rule."

RAF Training in the U.S.A.

GROUP CAPTAIN C. G. LOTT, CBE, DSO, DFC
Director of Training, Royal Air Force Delegation, Washington, D. C.

BY the end of November 1944, nearly 15,000 fliers had been trained in the U.S.A. for the Royal Air Force. Most of this training has been provided under the provisions of three schemes: the "Arnold," the "Towers," and the "British Flying Training School" (BFTS) schemes. The first was a scheme whereby part of the training resources of the U.S. AAF were made available to RAF cadets. These cadets received their training at the hands of civilian and Army Air Force instructors in company with American students. The "Towers" plan was a similar scheme but in this case the U.S. Navy apportioned part of their flying training capacity for the benefit of the RAF. The third scheme was one whereby RAF cadets were taught to fly in civilian-operated American schools, and the BFTS is today the only survivor of the three schemes. In addition to this training, many RAF personnel were given training at the Pan American School at Miami, and in all, over a thousand graduated from this school.

There were originally six BFTS's, of which four survive. These schools are institutions of considerable interest in that they are operated by American contractors [civilian aviators under contract], staffed by civilians both from the point of view of maintenance and instruction, equipped with American training aircraft, and trained to RAF syllabi. It is really extraordinary how well this combination is working; cooperation between all concerned is extremely close and the instruction has reached a very high standard.

To assist the American staff to interpret the Air Ministry training requirements, an RAF advisory and supervisory staff is provided. This consists of two flying instructors, two gunnery instructors, two navigation instructors, a ground subjects instructor, and an adjutant. Physical training and signals instruction is supervised by an NCO for each purpose, while the physical welfare of the cadets is supervised by an Army Air Forces medical staff.

When these schools were first brought into being, the standard of the training was not as high as was required, but I think that was natural. It was too much to expect the instructional staff to appreciate all the requirements of military flying training or to expect the very limited RAF representation in the U.S.A. at that time to provide an adequate guide to the Air Ministry requirements. Some period of evolution was essential, a process which has been continuing since the inception of the schools. New and detailed investigations into the problems of flying training are being undertaken month by month. Month by month the results of the investigations affect the methods by which flying instruction is given and the equipment with which it is done. Constant adjustments are also being made to the syllabus of training. Training never stands still; when it does, something is amiss and it is time to make changes in its direction.

The BFTS's have made steady progress throughout their careers and today their product compares favorably with that of any other RAF flying training establishment. It has been possible to conduct several interesting experiments with the training at these schools not possible in other establishments, by virtue of the "all through" system of training. By "all through" I mean that a new, untrained cadet is given both primary and advanced flying training at the one school, finally graduating with his "Wings" as a pilot.

The advantages of this system are obvious in that each cadet is under the continuous supervision of one staff throughout the entire period of his flying training up to "Wings" standard, which makes it possible to assess his capabilities and possibilities more accurately than in the case when he attends two separate schools for primary and advanced training. This system has not been possible throughout the rest of RAF flying training

as mass production of pilots on an Empire-wide scheme made it necessary for pilots trained under the British Commonwealth Air Training Plan to be processed first through a primary and then through an advanced flying training school, in order to get the maximum effort out of both personnel and equipment.

Each school caters for a population of 300 cadets made up of three classes of 100 each. The length of the course is thirty weeks, so that a class graduates approximately every ten weeks. During his stay in a BFTS each cadet is given seventy hours primary flying training and 150 hours advanced flying training, at the end of which he is expected to reach a standard of proficiency which will enable him to take his next stage of training in his stride.

Sited in the more southern latitudes, in Florida, Texas, Oklahoma, and Arizona, the schools enjoy a climate which makes flying possible all the year round, and seldom is training interrupted as result of bad weather. Instruction on the ground and in the air and the maintenance of the planes can therefore be planned with considerable accuracy. There is, of course, a disadvantage to continuous fair-weather flying in that the student is denied any opportunity of getting used to flying in the sort of weather he can expect to experience in an operational theater of war such as Europe. The vagaries of the English weather are notorious, as many readers will probably know from experience. Indeed, in Arizona it is extremely difficult to provide cadets with the experience of cloud flying which is a necessary part of their training. However, the fine weather is a great help to the organization and administration of the schools, permitting as it does long distance planning for the regular supply of new cadets. At no time in their history have any of the schools been compelled to extend a class through failure to complete the syllabus in the allotted time, and this has meant that planning for the supply of cadets can be made in good time without fear of any let or hindrance. To simplify this problem still further, each school graduates on the same day, enabling bulk provision of new cadets and avoiding duplication of transportation requirements. And this works both ways, to and from the schools.

There was a time when U.S. cadets and RAF cadets trained side by side not only under the "Towers" and "Arnold" schemes but also in the BFTS's. This happy state of affairs came to an end about a year ago. The RAF and U.S. training requirements were not quite the same thing nor were the same methods of instruction developed by each service, and it was inevitable that each would require its pilots to be trained to its own standards and by its own methods. In some ways this was a great pity, for a better method of cultivating a camaraderie and mutual respect between the forces concerned would be hard to find.

I have discussed the British Flying Training schools at considerable length because pilot training has been the major RAF training commitment in the United States, but RAF training has been provided in much greater variety than in the field of flying. The fields of engineering, radar, and radio have also provided a United States fount of wisdom from which RAF representatives have drunk, are drinking, and will, I hope, continue to drink. This training aid is not entirely one-sided, for RAF sources of information are also wide open to members of the U.S. forces. Indeed, seldom can a more complete exchange of information, experience, and ideas have been made than exists at present between the training organizations of the RAF, the U.S. AAF, and the U.S. Navy.

To foster this liaison and to simplify the exchange of ideas and information, the Combined Committee on Air Training in North America was formed. This committee was first convened at Washington, D. C., on 26 and 27 April 1943. This committee consists of a member from the U.S. Navy, U.S. Army Air Force, the RAF, the RCAF (Royal Canadian Air Force), and the United Kingdom Air Liaison Mission in Canada. Although the members are limited to this extent, it is usual for each meeting to be attended by a number of observers who are specialists in one sub-

ject or another to advise on the specialist subjects. No form of training is barred from consideration and full and free discussion on all sides ensures that all concerned are fully informed on development and experiments in the different forms of training conducted in each of the services. The Combined Committee on Air Training in North America is an excellent instrument not only for the dissemination of the information but also for tightening the bonds which exist between the services and for improving those personal relations which mean so much to good liaison.

This liaison is a product of war, born of necessity, but I venture to suggest that the need for this close cooperation will exist long after the war is over, and it is to be hoped that we shall continue to share our ideas, knowledge, and experiences by means of a similar instrument to the Combined Committee and by means of the exchange of students and instructors at our respective training schools.

Ordnance Calibration Teams

From *Army Ordnance* January-February 1945.

SEVEN Army Ordnance calibration teams in Italy and Germany are employing new electronic equipment to increase the accuracy and to extend the battle usefulness of American heavy artillery. The new equipment, which can be installed in a 2½-ton Army truck and transported right up to the battle front, is capable of measuring the speed of projectiles within one one-hundred thousandth of a second.

It is always a difficult problem to get a projectile squarely on the target at ranges up to seventeen miles. Involved in this operation are such factors as the age of the gun, the quality of the ammunition, the curvature of the earth, and such additional factors as wind, temperature, and barometric pressure. These constantly changing factors necessitate complex mathematical calculations and the use of the most modern scientific devices in order that the highest degree of firing accuracy may be obtained and effective barrages laid.

Old guns and howitzers cannot shoot as far as new weapons. Obviously when guns of different ages are being fired together in battery at the same target, allowances have to be made for each used gun. Experts of the Ordnance Department not only calibrated or synchronized front-line batteries in Italy and western Europe but also trained calibration teams to carry on this highly important activity.

This scientific work demonstrated that the life of gun tubes is much longer than previously assumed. In the past, gun crews discarded gun tubes rather frequently because they had no way of knowing the maximum efficient life of a tube and could not afford to take chances when the lives of our infantrymen were at stake. Today's electronic instruments give them this knowledge and reduce considerably the artillery supply problem.

Just as important as the long route march is the speed march, and if there has to be a choice between the two, the short, fast march might be considered the more important. There is many a time when troops have to pile out of their transport and move across country a few miles to reach their assembly areas. And usually, in situations like this, there isn't a minute to spare. A minute saved may mean the difference between achievement of surprise or running up against stiff resistance.

The point to aim at is ten miles in two hours in battle order.

—Canadian Army Training Memorandum, No. 28

"Enough and On Time - - - "

MAJOR JOHN T. MACDONALD, JR., *Quartermaster Corps*
Instructor, Command and General Staff School

HAVE you ever tried to visualize a measurement ton? If you haven't, take forty cubic feet and picture it in the form of a square of approximately three and one-half feet to a side. Or perhaps you can visualize a large-sized box, ten feet in length, two feet high and two feet wide. Load 40,000,000 of these boxes with supplies, enough to fill 3,478 Liberty ships, and transport them over thousands of miles of ocean to their ultimate destination. Perhaps then you can comprehend the vastness of our oversea supply operations.

Of these 40,000,000 measurement tons of supplies shipped to our oversea bases during the fiscal year 1944, the great majority comprised the ordinary items of supplies and equipment—rations, clothing, fuel, matériel, and ammunition—needed to keep a modern army in first-class fighting trim. However, other needs were not so ordinary because airfields, ports, storage depots, roads, hospitals, and communication lines had to be built and, in their building, huge quantities of materials were consumed.

Certainly these supplies did not reach their destinations by the pressing of a button; some agency had to control their flow, balance shipments against available shipping space, and act as a channel through which theater commanders could submit requisitions and communications relating to supply matters. The agency established to handle this tremendous business is the Oversea Supply Division at the Transportation Corps' domestic ports of embarkation.

Now that the majority of our troops are in oversea theaters, the importance of this agency has increased to the point where an understanding of its functions may prove of benefit. It must be remembered that, as long as we have troops overseas, the Oversea Supply Division must continue to function in high gear.

In the early days of this war, when our oversea bases or theaters wanted supplies, they might send their requisitions to the War Department, to the chiefs of the technical services, to the ports of embarkation, and in fact to any agency which might even remotely be connected with supply. When the supplies were not forthcoming promptly, as was often the case, the ports, as ultimate shippers, began to receive a flood of inquiries about requisitions, of some of which they had knowledge, but of many of which they had never heard. In the ensuing attempt to trace these requisitions, much confusion, delay, and disappointment resulted.

As a result of this situation, which had the earmarks of developing into a serious problem as more troops began to go overseas, it was decided to centralize the responsibility for overseas supply in one place. Thus, in July 1942, was created the Oversea Supply Division.

Here at last was a single agency to which oversea commanders could turn for information and which was solely concerned in seeing that supplies were shipped in sufficient quantities to maintain our troops properly. Once the number of troops which will be sent to any one theater has been determined, the War Department establishes a maximum and a minimum level of supply to be maintained in that theater. As soon as these two factors are known, it is up to the Oversea Supply Division to insure that the supply levels are maintained.

Now just how does the Oversea Supply Division fulfill its mission? First of all, let us see how it is organized. Under the Oversea Supply Division are sections representing each one of the seven technical services and the Army Air Forces, and, in addition, one or more sections to handle such things as post exchange, special service, petroleum, and other miscellaneous supplies. It is the function of these sections to receive and process all requisitions pertaining to their particular service or specialty.

Other sections are concerned with such things as making up shipping schedules and cargo distribution charts, controlling the

flow of cargo through the port, maintaining records of the troop strength and supply levels in oversea bases, handling the thousands of communications with oversea commanders on supply matters, and working out procedures for the control of all operations within the division itself.

The reason for this organization, as we shall see in a minute, is to expedite the processing, filling, and shipping of the supplies called for on the various types of requisitions received.

It should be noted that the flow of these requisitions from the theater to the port is a continuous process because it would be physically impossible to consolidate the requisitions of all of the services in an oversea theater on any one day. Moreover, it would be highly impractical because needs are constantly changing. However, the great majority of these requisitions are for the purpose of bringing supplies up to the authorized levels and do not present any great problems. On the other hand, many other special requisitions must be filled, such as those for controlled items and matériel status report items (some 600 items requiring special control by the technical services), and for those special projects which require supplies of an unusual nature or greatly in excess of authorized allowances.

Let us see how a requisition for ordinary items of supply will be handled by the Oversea Supply Division. First of all, either the SOS or the communications zone headquarters of an oversea theater will consolidate, by technical service (Ordnance, Quartermaster, Engineer, etc.), the requisitions of all of its supply establishments, and transmit them to the port of embarkation designated to serve that theater. These requisitions may come in by air mail on regular requisition forms running from one to hundreds of pages, or they may be transmitted by teletype, cable, radio, or letter, depending on the urgency with which the supplies are needed. Generally, requisitions will cover monthly or quarterly needs and normally will be submitted well in advance of the time supplies will actually be needed in order to allow sufficient time for processing, setting up, and shipping the items.

As soon as a requisition is received by the Oversea Supply Division, it is turned over to the proper technical service section for editing and the initiation of necessary action to secure the supplies. The editing procedure consists of checking the correctness of stock number, nomenclature, unit of measure, oversea address, and quantity requisitioned. It is the port commander's responsibility to see that the supplies shipped to an oversea base will not at any time exceed the maximum level established by the War Department, and at the same time he must insure that there will always be sufficient supplies on hand to maintain the minimum level. In editing requisitions from oversea commands, the Oversea Supply Division is guided by this dictum, but at the same time must exercise sound judgment when the theater commander requests that levels of some items be exceeded in order to meet some special situation.

Each technical service section handles all requisitions pertaining to its own supplies because, naturally, it is more familiar with them and is in constant touch with the chief of the service in order to keep up to date on the proper sources of supply. At some ports these technical service sections perform a dual role by acting as a technical staff for the performance of duties pertaining to their service for the port as a whole, in addition to their editing function. In this latter case they are also charged with the responsibility for following up all requisitions from the time they leave the port until the supplies are ready to be shipped.

The next step is to airmail a copy of each edited requisition back to the oversea base to assure it that, up to this point, the supplies it requested will be forthcoming, or will show the changes made.

At this time the edited requisitions are added up to see how much tonnage must be handled in the next convoy. Moreover, the theater commander has designated the items which he would like to receive first, within the limitations of available shipping space, and these priorities must be taken into con-

sideration. The resulting tonnage figures give the port a preliminary idea of how many ships it will need, and this is the first step in planning the loading of the cargo. If there is too much tonnage for one port to handle, it will call on neighboring ports to relieve it of some of the load. Thus, the supplies can be set up in the depots for shipment to the proper ports so that the ships in each convoy will have a full and balanced load.

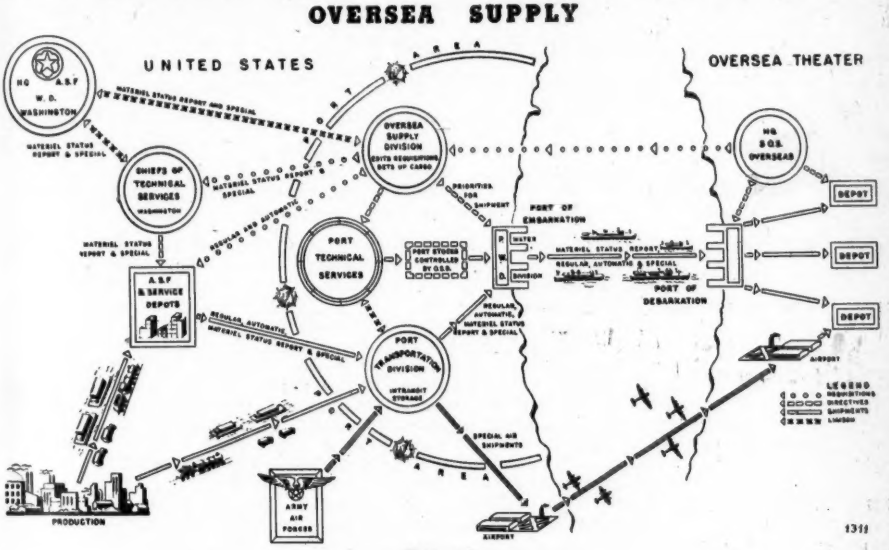


FIGURE 1.

While this is taking place, extracts of the edited requisitions are being made up for submission to the proper source of supply. The normal source of supply is a filler depot, designated by the chief of each service, to back up a particular port. There are, however, other sources to which extracts of requisitions are frequently sent, such as key depots which have been assigned the responsibility for storing the entire stock of selected items, district or depot procurement offices, market centers, or the office of the chief of a technical service.

Since convoy schedules are relatively inflexible for any one port, a time table must be adhered to in order that the supplies may be set up and shipped at the proper time. Thus, the requisitions must go forward to the sources of supply no later than a date known as the "cut-off date." A cover sheet is attached to each extract informing the intended source of supply that the items called for on the requisition should be set up for shipment to the port by another date known as the "initial date," and *must* be ready for shipment by the "limiting date." A hypothetical example of this time table, or shipping period schedule, is shown in Figure 2.

Once the depots, or other sources of supply, know what they are being called on to furnish, they can do one of several things. If the items are on hand, they can prepare them for shipment. If they are temporarily out of stock, they must, within twenty-four hours, inform their technical service's stock control point. Since this central stock control point is in a position to know the over-all supply picture for its own items, it will, again within twenty-four hours, advise that the requisition be re-extracted to another source able to supply the items, or re-extracted to a

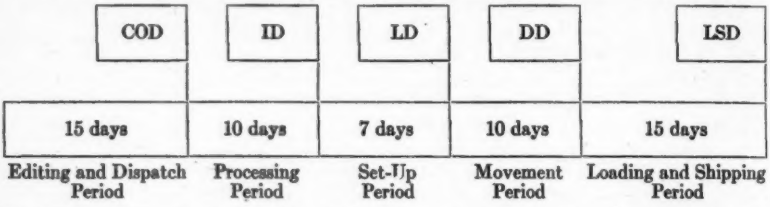
procurement office for purchase, or it will recommend cancellation of the items.

As soon as the depots know what action will be taken on all items which are not on hand, they will immediately send to the port a "notice of delayed items"—those which will not be ready for shipment by the limiting date but upon which supply action will continue. Items not available in the zone of the interior, for which no substitutes can be furnished and which normally will not be procured because they are obsolete or unauthorized, will be reported on a "notice of non-availability." Such items are automatically cancelled, upon preparation of the notice of non-availability, by the agency preparing the notice.

It must be remembered, since the flow of requisitions from the theater to the port and from the port to sources of supply is a continuous process, that, likewise, the flow of reports coming back to the port will be continuous. Thus, as it gets the information from sources of supply the Oversea Supply Division is enabled to keep the theater informed at all times of the status of particular items on the latter's requisitions by forwarding two copies of the aforementioned notices overseas. Here, however, "no news is good news," because only if an item is to be delayed or recommended for cancellation will the port be informed. Therefore, by inference, all the other items on requisition will be forthcoming at the proper time.

It might be well at this point to explain the method for handling controlled, matériel status report, and special operational project items, since these are often of the greatest concern to the theater. Controlled and matériel status report items are extracted by

PROCEDURE FOR SHIPMENT OF SUPPLIES TO OVERSEAS BASES



COD Cut-Off Date: The date on or before which port extract requisitions for oversea supplies to be shipped during a specified shipping period are dispatched from the port to depots or to other initial sources of supply.

ID Initial Date: The date on or before which:

(a) Preparation of supplies for shipment should be started.

(b) The first carload shipment or truckload shipment of items on a particular port extract requisition or shipping order may be made to the port, provided an ODT unit permit number has been received from Control Branch, Traffic Control Division, OCT. Less-than-carload shipments or less-than-truckload shipments, other than shipments of ammunition and explosives, may be shipped to a port without call from the port and without release from Control Branch, Traffic Control Division, OCT. However, such shipments will not be processed for shipment by depots prior to fifteen days preceding the initial date.

LD Limiting Date: The date by which all supplies called for must be set up at depots or other shipping points ready for immediate shipment to the port.

DD Deadline Date: The last date by which shipments must reach the port to be loaded as desired. This date is not published, but is determined by the port commander, who keeps Ocean Traffic Branch, Water Division, OCT, informed concerning it. The Ocean Traffic Branch will furnish information concerning deadline dates to Control Division, Traffic Control Division, OCT, and on request to shipping agencies.

LSD Last Shipping Date: Shipments to be loaded and vessels to sail on or before this date.

FIGURE 2.

the port directly to the chiefs of the technical services concerned, who will initiate supply action if the amounts are not unreasonable and have been satisfactorily justified by the theater and the Oversea Supply Division. At the same time, an information copy is forwarded to the Distribution Division, Headquarters, Army Service Forces, so that it may review and coordinate the requests for excessive quantities.

Special operational projects are of two types: (1) War Department Prepared (WDP) projects containing long-range estimates of requirements for projected operations in oversea theaters, and (2) Theater projects, prepared by the theater and based upon WDP projects, required to support directed or projected operations of the theater. For example, the construction of airfields, signal communication systems, and the repair of harbors require equipment and supplies over and above those needed to fill and maintain authorized allowances. Because of the necessity for including these items in supply procurement plans well in advance of the time they will be needed, all such projects must receive prior approval from the War Department and review by Army Service Forces agencies.

As far as the Oversea Supply Division is concerned, it obtains a list of approved projects from the War Department, including a list of the items approved. When the theater is ready to carry out the project, it will requisition all or part of the supplies it needs, and the Oversea Supply Division is then able to take intelligent action. For noncontrolled items appearing on these requisitions, normal supply action is initiated. Requisitions for controlled or matériel status report items are also handled as previously described by being extracted to the chief of the appropriate technical service even though the project has been previously approved.

As soon as sufficient information has been accumulated by the Oversea Supply Division as to the status of items on requisition, whether for normal or special supplies, it is in a position to take the next step. This involves the preparation of a cargo distribution chart which lists the items, their measurement tonnage, the overseas address and other markings, the depot from whence they are being shipped, and the convoy in which it is expected they will be loaded.

Then, based on this information, adjustments may be made in earlier estimates as to the number of ships required, and the Chief of Transportation is informed. Once this is done, a loading plan can be made up, giving in detail the specific cargo which will go in each ship and telling where it will be stowed. As soon as the loading plan has been made and it is known exactly where and when each ship will be berthed, the Transportation Division will call in the supplies from the depots.

Although the depots have been informed that they must have supplies set up and ready to ship by a certain date, they do not actually make shipment until directed to do so by the port. In this way we avoid the mistake made during the last war when each service, anxious to do a first-class job, sent carload after carload of supplies into the ports regardless of priorities, available storage space, or available shipping. This practice resulted in one of the greatest rail traffic jams in history, and greatly hampered efforts to get the right supplies overseas.

In this war, the depots pack and mark each shipment and prepare a War Department Shipping Document, copies of which are sent to the port in advance of the shipment. The port uses this shipping document in several ways. First, it is used for information as to what items have been shipped in, and this allows plans to be made for their receipt. Secondly, when the shipment actually arrives at the port, the shipping document can be checked against the original extract requisition to insure that the shipment is complete.

As soon as the shipment has been called into the port by the Transportation Division, additional copies of the shipping document go with it to act as a final check. If for any reason a ship becomes unavailable at the last minute or if there is a change in plans when shipments are already en route to the

port, the supplies may be held up for a few days at a holding and reconsignment point, well removed from the port, until things can be straightened out. Great care must be exercised to prevent congestion in the port area itself due to the limitations of storage space.

When the supplies to go on a particular ship arrive, the process of loading is started by the Water Division. A manifest is made up showing the description, weight, and cubage of the supplies, as well as the hatch in which each item has been placed. To this manifest are attached copies of the War Department Shipping Documents covering the supplies loaded aboard a particular ship. It is then a simple matter to cable the oversea commander citing the name of the ship and giving general cargo information. To make sure that nothing goes wrong, the port, when loading is completed, airmails copies of the manifest, the stowage plan, and the shipping document to act as a double check.

Supply Problems in Fast-Moving Operations

From a personal letter to the editor from an officer on the staff of the Third Army in France.

THE race put on by this army has left us reeling a little. The problems of supply for such a large and fast-moving organization were many, constant, and perplexing. It was an ever-present necessity to pull rabbits out of the hat—the "bunny" being such minor items as an additional 200,000 gallons of gas or a quarter of a million rations. It was clearly established that a thoroughly experienced communications zone would be a mighty comforting setup to have supporting you. As it happened, that agency became operational about the same time we did. Both started from scratch. We had foreseen the problem and managed to gather in our area a reserve of some 1,500,000 gallons of gas, and the same number of rations. This saved us until it was all exhausted; then we lived on a day-to-day basis. There may come a time when I will be able to figure out how it was done, but I'm too close to it just now to do so.

The supply problem was complicated by having a part of the army moving west through Brittany and the remainder moving east. We had two separate setups. I think it may be said that no one went hungry, and there was always some means for getting gasoline even though we had to capture it at times. Our field bakeries were able to keep up most of the time and fresh bread was issued daily. The Class I section feels very proud of this.

We are in a section of France I knew during the last war. The scars of battle still are everywhere about us. The old city near by has the same bridges knocked out, all replaced by the same type temporary bridges. Needless to say, we have moved so many times that it is all a part of a day's work now. I always preached, "Keep 'em mobile," and I've had a good opportunity to prove that my idea was a sound one.

The service units that were no good in the States are worse under these conditions. A trip across an ocean does not change the leopard's spots. We have had rough going with some of them. Others do quite well. The kind I am referring to are in no case *first* rate. The officers who were keen and enthusiastic back home do well here. The dullards are a stone around our necks. The keenness to get the job done, the strength of character to be there on the job supervising when the going is tough, and accuracy are the qualities most lacking. Supply discipline does not receive sufficient emphasis in training. I think it should be done by a regular outlined course. Lieutenants and sergeants should be required to take their platoons and sections on field trips, alone. They should be required to develop initiative and should have practice in meeting unusual situations.

COMMAND AND GENERAL STAFF SCHOOL

MILITARY REVIEW

FORT LEAVENWORTH, KANSAS

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MILITARY REVIEW

Command and General Staff School, Fort Leavenworth, Kansas

Operations of XV Corps in Forming the Argentan-Falaise Pocket

Prepared by G-3 Division, Supreme Headquarters Allied Expeditionary Force.

Prepared by G-3 Division, Supreme Headquarters Allied Expeditionary Force, for publication in the MILITARY REVIEW, *Command and General Staff School, Fort Leavenworth, Kansas. The article is based primarily on the action reports of the XV Corps and the divisions concerned. The material was obtained with the assistance of G-3 Division, Third U.S. Army, and the Historical Section, Headquarters European Theater of Operations U.S.A.*

THE XV Corps, operating under the Third U.S. Army, played a major role in the operation which led to the encirclement and strangulation of the German 7th Army in the Argentan-Falaise pocket. This operation was one of a series of fast-moving, open-warfare operations which occurred after the First U.S. Army had crashed through the left flank of the German defensive line in Normandy, late in July 1944.

At 1600 on 31 July 1944, by oral * order of the Commanding General, Third U.S. Army, the XV Corps became operative and the 83d and 90th Infantry Divisions, then under VIII Corps, were attached to it. The following day, the 5th Armored Division, then with the XX Corps, was also attached.

On 1 August, the Commanding General, XV Corps received warning orders to advance to the southeast as soon as the situation to the front would permit. All types of motor transport, including tanks, were to be used to the maximum for transporting infantry. Tanks were to precede the columns. This movement was initiated at 2300 by the 90th Division, which marched from Périers with a mission of blocking enemy movement from the east toward Avranches and of securing a crossing of the Selune River near St. Hilaire (Figure 1).

On 2 August, the 90th Infantry Division continued its advance. The 79th Infantry Division, then with the VIII Corps, was given the immediate objective of capturing Fougères. Immediately after the capture of Fougères, the 79th Infantry Division received orders attaching it to XV Corps. During the night of 2-3 August, the 83d Infantry Division reverted to the VIII Corps.

By 3 August, the 79th and 90th Infantry Divisions had taken their initial objectives and had assumed the defense on the line Fougères-Mortain. The 5th Armored Division closed in an area near St. James. The 106th Cavalry Group, which was in the vicinity of Fougères, was attached to the Corps.

At 2115, 4 August 1944, the Corps Commander received oral orders from the Commanding General, Third Army, to move without delay, seize and hold a bridgehead east of Mayenne until relieved by the First U.S. Army, seize bridgehead at Laval, and secure the Mayenne River as far south as Château-Gontier. This part of the Mayenne River has steep banks and averages from 175 to 200 yards in width and five feet in depth. All bridges, except one at Mayenne, had been blown by the Germans. The river consequently presented a major military obstacle.

At 2300 the Corps Commander issued oral instructions for the movement. The 79th and 90th Infantry Divisions were ordered to advance abreast, the 79th on the right, and the 5th Armored Division to move echeloned to the right rear, prepared to execute an envelopment when the tactical situation indicated. Elements of the 106th Cavalry Group were to operate in each division zone.

On 5 August, the Corps advanced rapidly. The 90th Infantry Division seized the bridge at Mayenne, which, although prepared for demolition, had not been blown (Figure 2). Leading elements of the 79th Infantry Division reached a point about two miles northwest of Laval. Late in the afternoon the Corps Commander received orders to capture Le Mans, about fifty miles to the east of the

* All orders referred to in the following as being verbal were immediately confirmed in writing.

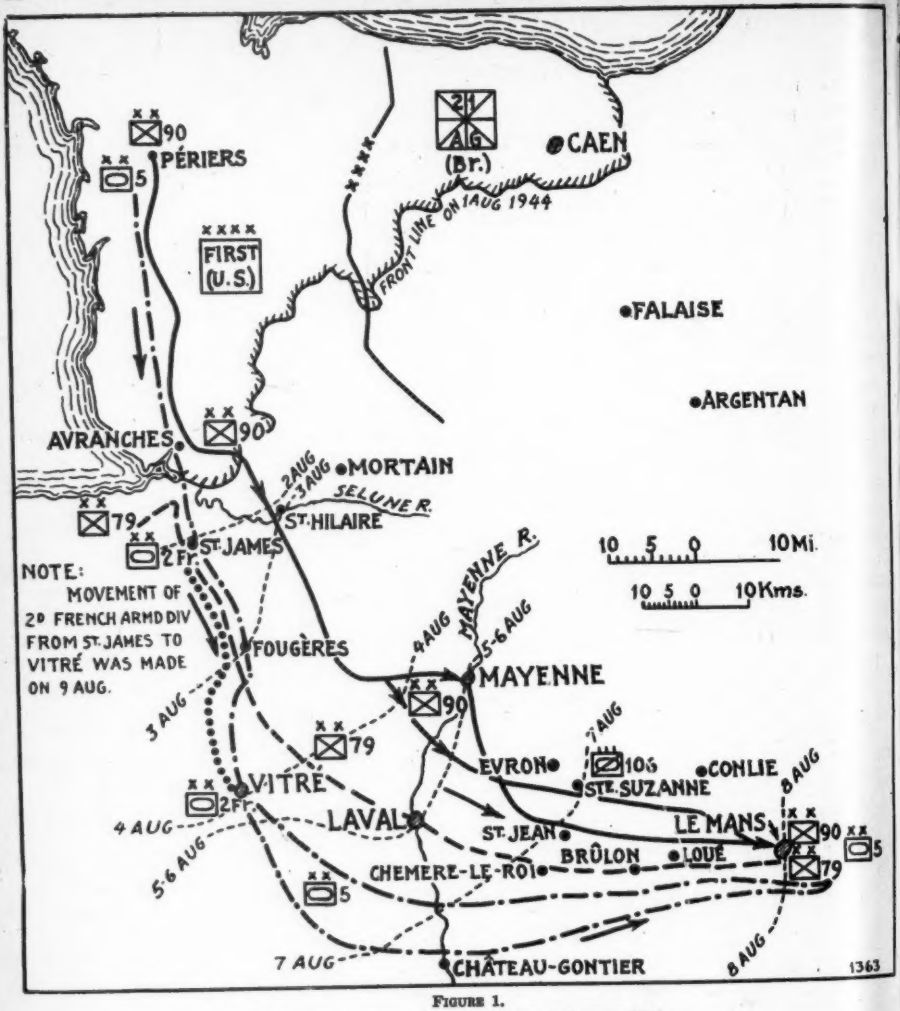

FIGURE 1.
ADVANCE OF DIVISIONS, 1 AUGUST TO 9 AUGUST 1944.

Mayenne River. Orders were issued for the continuation of the advance with divisions in the same relative positions. The 106th Cavalry Group was disposed to cover the north flank of the Corps from the vicinity of Evron.

On 6 August, the 1st Infantry Division, under the VII Corps, First U.S. Army, relieved the 90th Infantry Division in Mayenne, thereby permitting the 90th Division to proceed toward Le Mans on the following day. The 79th Infantry Division captured Laval, effecting the initial crossing over the Mayenne River by foot bridges constructed by the division engineers.

During 7 August, the XV Corps converged on Le Mans. The 90th Infantry Division en-

countered determined resistance from enemy infantry supported by artillery and tanks in the vicinity of Ste. Suzanne and along the main road from St. Jean-sur-Erve to Le Mans. Approximately 1,200 prisoners were taken in this area, most of whom were from units driven by the south column into the north column of the division. In the zone of the 79th Infantry Division, enemy resistance which was encountered at Chemere-Le-Roi, Brûlon, and Loué was overcome before dark. In order to hasten the fall of Le Mans, it was decided to attack on the following morning from the southeast, west, and northwest. Orders for the attack were issued at 2100. Le Mans was occupied by dark on 8 August.

The 79th Infantry Division held roughly the southern half of the city, the 90th Infantry Division the northern half, and the 5th Armored Division passed to the southeast and completed the encirclement to the east and northeast. After considerable street fighting, all parts of the city had been taken. The 106th Cavalry Group covered roads into Le Mans from the north and northwest and continued to protect the north flank of the Corps from the vicinity of Conlie.

Thus, by 9 August the XV Corps had established itself in the vital communication center of Le Mans, on the left flank of the main German forces. During the advance from the Fougères-St. Hilaire area to the Mayenne River, units of the VIII Corps had been moving to the south, covering the right flank of the XV Corps, and units of the VII Corps holding the line near Mortain, to the north. In advancing from the Mayenne River to Le Mans, however, the Corps became exposed on either flank. Protection was provided by the 5th Armored Division, the 106th Cavalry Group, the XIX Tactical Air Command, and French Forces of the Interior.

Meanwhile, at Mortain, on the morning of 7 August, the Germans launched their heaviest counterattack since D-day. They apparently were making a desperate effort to reestablish their line to Avranches, thereby cutting off the Third Army. On the 9th of August, the counterattack was still in progress. In spite of this major threat to lines of communication, the XV Corps was ordered to push deeper into enemy occupied territory. This is typical of the bold action which was taken in order to capitalize on the advantage obtained by the initial breakthrough.

On 9 August, the Commanding General, Third Army issued orally the order which started the XV Corps on its drive to close the southern jaw of the now famous Argentan-Falaise trap. It directed the Corps to change the direction of advance to the north and to capture Alençon. That same day the 2d French

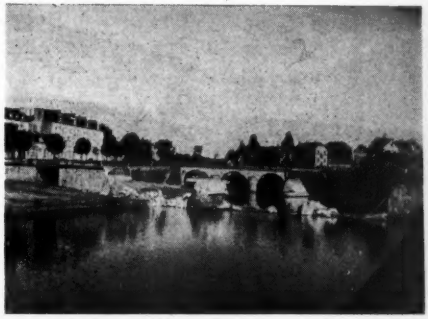

FIGURE 2.

TWO HIGHWAY BRIDGES AT MAYENNE. BRIDGE IN BACKGROUND SEIZED INTACT ALTHOUGH IT HAD BEEN PREPARED FOR DEMOLITION.

Armored Division, which had recently arrived on the continent, was attached to the Corps. By dark that evening the division was en route from the vicinity of St. James to Vitré (Figures 1 and 3).

The Corps Commander issued orders for the advance northward, east of the Sarthe River with the 5th Armored Division, closely followed by the 79th Infantry Division, on the right; and the 2d French Armored Division, closely followed by the 90th Infantry Division, on the left. The mission of driving the enemy from the selected crossings of the Orne River within the Corps zone of action was given to the 5th Armored Division. The 80th Division, which was attached for a brief period before reverting to the XX Corps, gave one RCT [regimental combat team] mission of securing the bridgehead at Le Mans and protecting the left flank and rear of the

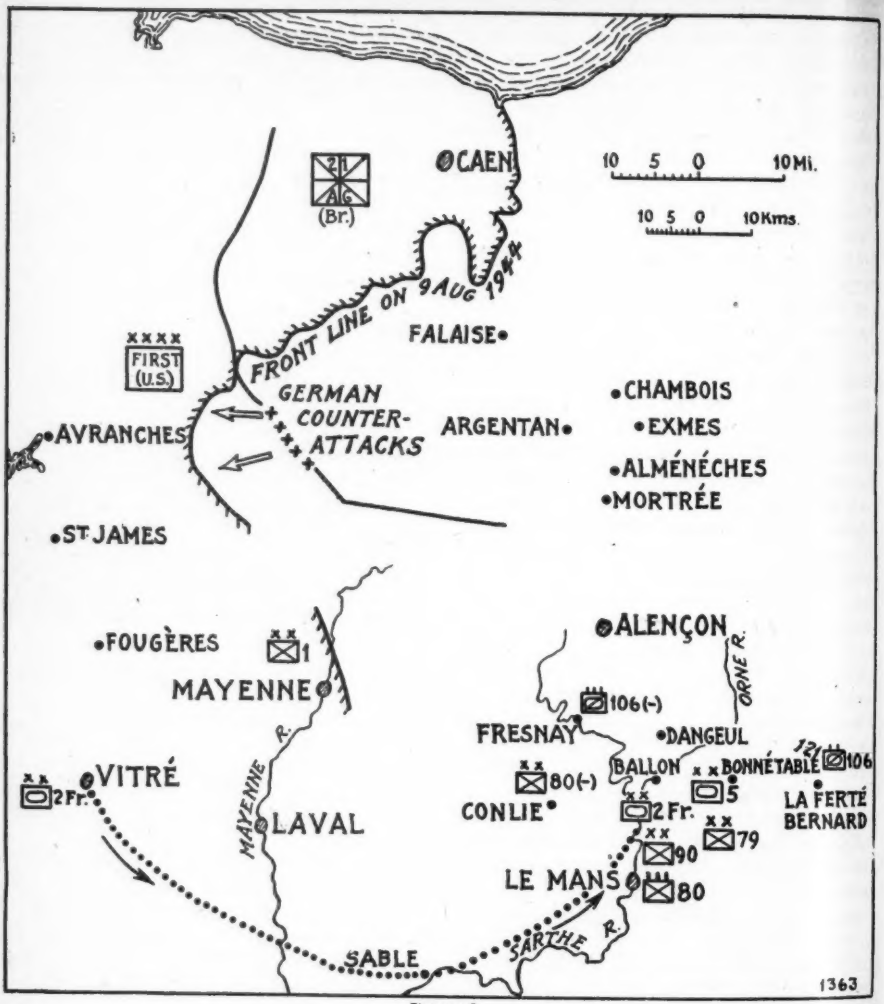

FIGURE 3.
DISPOSITION (SCHEMATIC) OF XV CORPS FOR ATTACK ON 10 AUGUST 1944.

Corps. One squadron of the 106th Cavalry Group was shifted from the west flank in the vicinity of Conlie to cover the east flank of the Corps from the vicinity of La Ferté Bernard (Figure 3). Maximum use was made of the Sarthe River to protect the west flank of the Corps.

In order to reach its line of departure, the 2d French Armored Division would have had to pass to the south and east around both Le Mans and the 5th Armored Division, a time consuming maneuver, or proceed by direct route across the rear of the 5th Armored Division and the 79th and 90th Infantry Divi-

sions, a risky and difficult movement. The latter plan was decided upon, as time was of the utmost importance. This presented an interesting logistic problem for the Corps staff. By careful planning and supervision the French division was moved from the vicinity of Vitré to an area southeast of Sable, thence across the rear of the three divisions to its line of departure (Figure 3). In the art of war, such a maneuver has always been, and still is, considered objectionable. This action illustrates the value of the flexibility of fast moving motor columns in accomplishing such a move when it becomes necessary.

By dark on 9 August the Corps Engineers had constructed two bridges across the Sarthe River, over which the 2d French Armored Division moved into position during the night 9-10 August and the following morning. During the afternoon of 9 August, and the night of 9-10 August, the 5th Armored Division drove the enemy from the designated crossings of the Orne River, turning over these crossings in the French zone of action to the 2d French Armored Division before noon on 10 August.

In accordance with the plan outlined above, XV Corps attacked at 0800, 10 August. At this time the Corps included the 2d French Armored Division, 5th Armored Division, the 79th, 80th, and 90th Infantry Divisions, the 106th Cavalry Group, and supporting troops. Determined enemy armored and artillery resistance was met at the crossings of the Orne, and at Ballon and Dangeul. The day's action was characterized throughout by sharp tank actions in which both sides suffered casualties in personnel and equipment. During the afternoon, the 5th Armored Division was subjected to artillery harassing fire from the vicinity of Bonnétable (Figures 3 and 4).

The attack of the 2d French Armored Division was hampered during the day by congested roads in its zone of action, but by 1930 both armored divisions were going forward well, followed closely by the partially motorized infantry divisions. By dark the Corps had reached an east-west line through Beaumont-sur-Sarthe (Figure 4).

On 11 August, the 5th Armored Division advanced against light resistance. The 2d French Armored Division suffered tank losses from artillery fire from the vicinity of Doucelles, but continued its advance to the north. Early information indicated that the bulk of two first-class enemy divisions were in the Forêt de Perseigne. However, it was reported later that the forest had been evacuated. At the risk of disaster should the Germans still be there, the Corps Commander directed that the forest be bypassed in order to hasten toward Argentan and cut off the German retreat to the east. Although this decision separated the forward divisions of the Corps by an obstacle about twelve miles wide, later results justified this action.

While the remainder of the XV Corps was attacking north of Le Mans, the 80th Infantry Division, which had concentrated in the vicinity of Vaiges, executed its assigned mission of protecting the left flank and rear of the Corps. In sharp skirmishes at Sille-le-Guillaume and north of Ste. Suzanne it forced the withdrawal to the north of German covering forces whose presence in the area was a threat to the Le Mans bridgehead. After reverting to XX Corps, and later under V Corps, this division took part in the advance to the north, on the left flank of the XV Corps. One squadron of the 106th Cavalry Group, operating on the right flank and rear of the Corps, furnished protection against an attack from the southeast, where strong forces of Germans were reported to be concentrating.

Early on the morning of 12 August, elements of the 106th Cavalry Group and the 5th Armored Division, which had passed to the east of the Forêt de Perseigne and the Forêt D'Ecouves, were on the outskirts of Argentan, where they reported large enemy forces of all arms moving toward the east. Elements of the 5th Armored Division captured Sées by 1010, and by 1630 were in Mortrée. The 2d French Armored Division, in an attempt to bypass the Forêt D'Ecouves, moved into Sées, where it encountered units of the 5th Armored Division. The French then moved to the west and northwest, marching on Carrouges and Argentan. This column

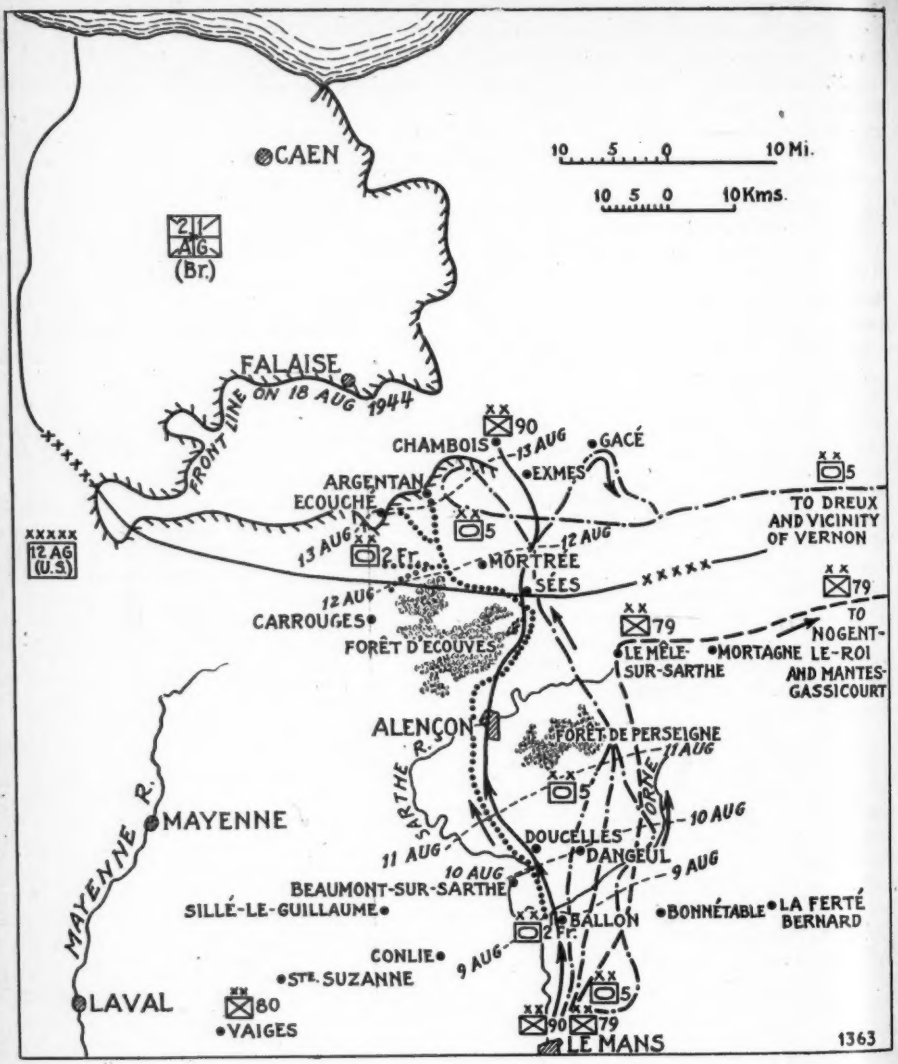

FIGURE 4.
ADVANCE OF DIVISIONS, 10 AUGUST TO 21 AUGUST 1944.

was stopped before reaching Carrouges. Other elements of the division which attempted to enter the forest encountered strong resistance from tanks, tank destroyers, and self-propelled artillery, and likewise were unable to advance.

The 90th Infantry Division occupied Alençon and commanding ground west and

southwest of the town during the afternoon of 12 August. The 79th Infantry Division was ordered to the vicinity of Le Mêle-sur-Sarthe in Corps reserve, prepared to move north, northeast, or northwest on Corps order.

On 12 August, the Commanding General, Third Army, directed XV Corps to push on slowly in the direction of Falaise after the capture of Argentan in order to allow the Corps rear elements to close. It was instructed to make contact with Allied forces pushing down from the north. This action was being initiated when orders were received rescinding these instructions and directing the Corps to halt on the Orne. The 5th Armored Division, however, was charged with preventing German use of the roads leading east from Argentan, without becoming involved in a serious fight for the town, and with cutting roads leading out of Gacé to the east. By 1700, elements of the division were closing in on Gacé. On the morning of 13 August, the Commanding General, XV Corps, directed the 2d French Armored Division to break contact south of the Forêt D'Ecouves, move around the east of the forest, and continue on Argentan. The 90th Infantry Division was directed to relieve the French south and west of the forest and to occupy the high ground west of the forest between Alençon and Carrouges. By dark the French were in front of Argentan, and at Ecouché and Carrouges. The 90th Infantry Division was in position as ordered. The 79th Infantry Division remained in Corps reserve throughout the day.

Early 14 August, approximately fifty enemy tracked vehicles attempting to escape from the Forêt D'Ecouves moved to the southeast toward Mortagne. During the day most of these were destroyed by the 79th Infantry Division and the Air Force.

During the late afternoon on 14 August, the Army Commander, at the Corps command post, orally directed the XV Corps with half of its divisions to march on Dreux (Figure 5). The 2d French Armored Division was directed to relieve the 5th Armored Division near Argentan, and the 90th Infantry Division was moved north from the Alençon area to extend to the east the holding force at Argentan. With routes through Argentan denied the Germans by the action of the 90th Infantry Division and the 2d French Armored Division and by interdiction fire from the 155-mm guns of the corps artillery, it was essential that routes through Dreux be blocked, this being the last important avenue of escape to the east passing south of Paris. The 79th Infantry Division and the 5th Armored Division were ordered to march rapidly on Nogent-le-Roi and Dreux, respectively, prepared to cross the Eure and continue to the Seine. Both divisions marched early on 15 August. The XV Corps captured Dreux and established a bridgehead east of the Eure on 16 August. Early on 20 August, elements of the 79th Infantry Division crossed the Seine west of Mantes-Gassicourt and established the first allied bridgehead east of the Seine, thus adding to the difficulties of the fleeing Germans.

During these fast-moving operations up to but not including the movement to Nogent-le-Roi and Dreux, the Corps contacted and was opposed by a vast array of German units. The 708th Infantry Division and the 9th Panzer Division were met in full strength. Battle groups from the 116th Panzer and 130th Panzer Lehr Divisions and more than a regiment of the 6th Parachute Division were encountered. Prisoners of war were taken from nineteen other divisions, including nine infantry, two panzer, two parachute, and six SS panzer, and more than fifty miscellaneous units ranging from assault-gun battalions to reconnaissance brigades. Most of these latter units were of battalion or regimental size.

It is estimated that during these operations the Corps inflicted more than 25,000 casualties upon the enemy. More than 12,000 prisoners of war were taken (see Figure 6). A conservative estimate of German equipment captured or destroyed includes 200 tanks, 225 artillery pieces, and 675 vehicles.

With XV Corps advancing toward the Seine with two of its divisions, it became necessary to establish a command group for

the three remaining divisions. Therefore, on 16 August a provisional corps, commanded by the Chief of Staff, Third U.S. Army, was formed for the specific mission of carrying on the attack to the north, utilizing the 2d French Armored Division with the 80th (less one RCT) and 90th Infantry Divisions, a group headquarters, four battalions of corps artillery, and other supporting troops.

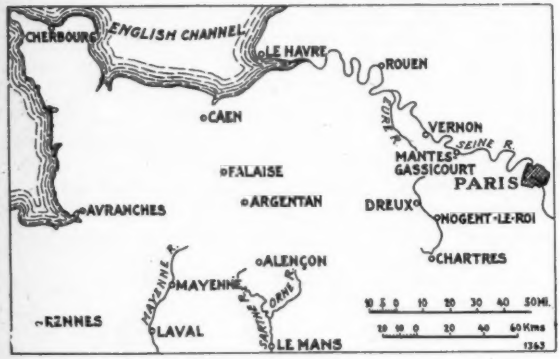

FIGURE 5.

Before operational control could be assumed by the provisional corps, however, the tactical situation was clarified to the extent that it was not necessary for this corps to become operational. On 17 August these divisions passed to control of First U.S. Army and the Commanding General, V Corps, took command of operations in that area.

At 0630, 18 August, an attack was launched with the mission of capturing Argentan and Chambois (Figure 4). Heavy German resistance slowed the advance but the 90th Infantry Division captured Chambois and made contact with elements of the Polish Armored Division at 2015, 19 August, thereby bridging the gap. The 80th Infantry Division captured Argentan on 20 August.

August 21st brought the end of the pocket. Throughout the day the destruction continued, but operations were in the nature of mopping up, with Germans continuing

FIGURE 6.
EIGHT HUNDRED NAZI PRISONERS FROM THE ARGENTAN-FALAISE POCKET.

individual and mass surrender. Late in the day the V Corps was ordered to turn over the sector to the British as they advanced from the north, and to withdraw to assembly areas south of the Argentan-Exmes road. This was accomplished on 22 August.

During this period, artillery supported the Corps advance and heavily pounded the enemy attempts to escape. Hills that ringed the pocket in which the German forces had been trapped provided full observation of enemy movements. Enemy losses resulting from this fire were extremely heavy. A two-hour artillery truce was declared by the 90th Division on 20 August to give the enemy a chance to surrender. Two thousand Germans took advantage of the opportunity.

The closing of the Argentan-Falaise gap was, in reality, a splendid example of the Allied effort. The British, Canadians, and Poles from the north joined the Americans and French on the south to close the last escape route, while other American and British forces drove in from all sides to annihilate the encircled German troops. As is well known, this action and those immediately following brought about the destruction of the German 7th Army.

The principal points of interest from a tactical point of view are:

a. The flexibility of the corps. For this operation, the XV Corps received divisions from other corps, carried them through a successful operation, dropped part of the divisions, and continued on a different mission. It proves the desirability of uniform training in all divisions.

b. The rapid envelopment of the flank and rear of the enemy after a breakthrough had been accomplished. Bold action was required to take advantage of the temporary disorganization of the enemy as a result of the breakthrough, so as to prohibit, or at least delay, his reorganization.

c. The use of armored units to protect the exposed flanks of the corps.

d. The immediate initiation of the second and deeper envelopment for the purpose of trapping units that were fortunate enough to escape from the first pocket.

Army's M-Dogs Detect Enemy Mines

From *Army Ordnance* January-February 1945.

THE Army is now using dogs to locate the deadly antipersonnel mines and booby traps set by the enemy.

The dogs who do this dangerous work are known as M-dogs, the elite of the K-9 Corps. These canine specialists locate mine fields, lead the way around them, or point a safe path through them. They also indicate areas that are free of the death-dealing devices. As soon as M-dogs locate mines or booby traps, the explosive devices are either removed or deactivated and the cleared areas marked with tape.

The Quartermaster Corps developed this mine-detecting method and began training dogs of the K-9 Corps for the work more than a year ago. Following the regular basic dog training, specialized training makes expert land-mine hunters out of the war dogs. They are considered fully trained when they can carry out their mission over all kinds of terrain and in all sorts of weather. They have found and indicated to their masters the presence of mines that have been buried for weeks. They are especially proficient at indicating the presence of non-metallic mines, which defy the best mechanical detectors.

The M-dog works on a six-foot leash. When he discovers the presence of a mine or booby trap, he signals his find to his handler when at a distance of one to four yards from the concealed device. Each animal, however, invariably alerts at approximately the same distance each time, enabling the handler quickly to find and mark the exact spot of concealment.

Rockets and Their Capabilities

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Instructor, Command and General Staff School

TESTS made in the States and by the First Army under combat conditions have proved conclusively that the field artillery arm has a new addition in the family. The new member is the rocket projectile. This potent weapon has long been a source of mysticism and wonder, being treated in the category of a super-secret weapon. However, the fact that it has definitely been established as a part of the field artillery and that an organization has been set up to control it makes it of positive interest to everyone.

Undoubtedly the increased use of rockets by our enemies and now by our own troops has accentuated a desire to know more about their construction, usage, and results. Thus far it has been strictly "hush-hush" information, and has caused a rampant surge of

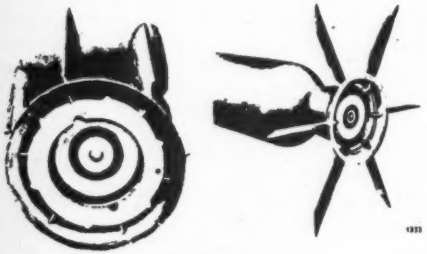

FIGURE 1.

FINS ON 4.5-INCH ROCKET: LEFT—PRIOR TO LAUNCHING. RIGHT—IN FLIGHT AFTER LAUNCHING.

incorrect data to be circulated concerning the rocket and the obtained results. So without attempting to divulge secrets or explain the inner workings or processes of this potent weapon, the author would like to assist the reader in realizing the true picture, establish a proper placement of values on the rocket, and instigate some comparison with other field artillery weapons.

The rocket has many characteristics and capabilities comparable to the conventional artillery piece, but is should be clearly pointed out that at its present stage of development it cannot replace the artillery in a combat role. It can only augment its fire. Rocket launchers can be used to put down a mass of fire on an area to supplement artillery and bombing in preparation for a deliberate attack or defense of an area. Against targets of opportunity, the rocket is limited to special situations entirely, and the ability of the rockets to fire will depend on many factors which we shall discuss later.

As we shall be concerned primarily with the newest member of the artillery family, our discussion will cover only the 4.5-inch rocket and launcher. This rocket is ammunition containing a fuzed explosive charge, which is propelled by a jet of gas produced by the burning of a propelling charge within the rocket motor body. The best example of this with which we are familiar is the Fourth-of-July skyrocket which is activated on the same general principle. Rockets, as compared to the standard artillery piece, are limited in range and accuracy and are more susceptible to temperature changes. Their chief advantages are the absence of recoil in firing and the great mass of fire that can be delivered by a large number of launchers requiring only a few men to service them. They can also deliver fire with artillery explosive effect from positions normally inaccessible to field pieces.

Experimentation has shown that the rocket can be fired using the case in which it is packed as the launcher. Also, as the rockets are fired by electrical discharge, it is possible to fire any size cluster by single rounds, or to fire in sequence. When fired in sequence it is termed "ripple" fire.

By the addition of fins on the rocket (Figure 1), much like those we use on our aerial bombs, we gain further control of the flight of this projectile. These fins collapse into the base of the rocket until launched, then snap out into place when it leaves the launcher. With this element of control we are able to guide the projectile with greater accuracy, and it is less affected by cross-currents of wind.

Another type rocket uses a spinning motion (this rocket has no fins) and bores through the air by rotation, just as our artillery projectiles do. This type has a much greater accuracy than the "fin" type, which is reported to have about sixty percent greater dispersion than the rotation rocket.

The 4.5-inch rocket weighs approximately forty pounds, which is comparable to the 105-mm howitzer ammunition and also gives approximately the same result in area coverage as the light artillery burst. We have several types of this 4.5-inch caliber.

One type of 4.5-inch rocket is an eight-tube projector which may be mounted on a ¾-ton weapons carrier or larger truck or may be mounted on the ground. It has a low silhouette and is easily concealed, enabling it to be emplaced well forward in the battle area. However, as its weight is heavy, around 800 pounds, movement from location to location necessitates use of vehicles. This type of rocket launcher must be traversed by pointing the truck or by shifting the trail if emplaced on the ground. It is laid for direction by compass or an aiming circle, and laid for elevation or range with the aid of a gunner's quadrant. All types must be reloaded by hand, but the eight-tube rocket can be reloaded in two or three minutes by a crew of two men.

From the various types of launchers, coupled with the possibility of launching direct from the container, potent possibilities may yet be uncovered. It will be possible for even the infantryman to make use of this projectile by merely sighting it at the designated target and firing it, using a battery or a portable generator to furnish the charge necessary to launch the rocket.

Characteristics of rockets establish a wide range dispension at short ranges (see Figure 2), but as the range increases the range dispersion decreases while the deflection dispersion increases. Also, this deflection dispersion is much greater than that found in artillery ammunition. It should be pointed out that this change in the dispersion pattern at the extreme range of the weapon is opposite to that of the artillery piece, as the dispersion factor of artillery ammunition is extended in the direction of fire rather than perpendicular to it. Thus this increase in width of the area to be covered gives the rocket an excellent characteristic in having its most effective coverage in width at the maximum ranges. As a comparison, it has been found that the coverage of a large number of rockets at a single range of 2,000 yards gave a dispersion coverage in range of 1,000 yards and only 300 yards in deflection,

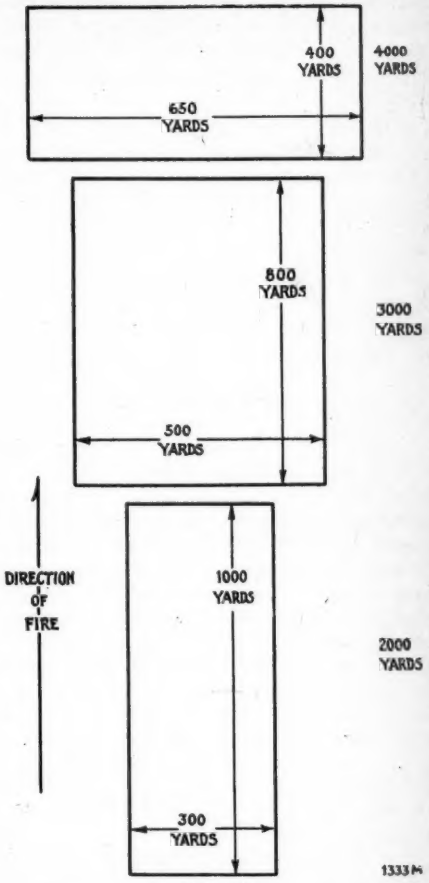

FIGURE 2.
APPROXIMATE DISPERSION AREA FOR 4.5-INCH ROCKET PROJECTILE.

while the same number of rockets fired at a range of 4,000 yards covered only 400 yards in range yet increased their deflection coverage to 650 yards. Compare this coverage with that of a light field artillery battalion concentration which is 150 yards wide by 300 yards in depth, or a medium battalion concentration 250 yards wide and 400 yards in depth.

It may be assumed that the center half of the areas mentioned would be subjected to a

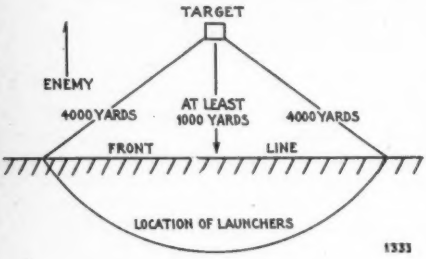

FIGURE 3.
PLAN FOR LOCATION OF LAUNCHERS AS CONCERNS A PARTICULAR TARGET.

complete coverage and that complete neutralization could be effected, while the outer extremities would be only lightly covered, and occasionally at short ranges of the pattern stray rounds may fall in any spot, thus requiring the center of the target area to be some distance ahead of our own troops. The projectile now used with the 4.5-inch launcher is constructed for a concussion effect only and very few casualties are obtained from fragmentation, although it is contemplated that a fragmentation projectile, similar in effect to the 105-mm howitzer shell, will be developed.

For concussion effect the burst of the rocket is very similar to the 105 projectile, and covers about the same width of area with the burst. Basically it is an area weapon and should not be expected to get results on a point target by precision methods.

The eight-tube launcher can fire at a sustained rate of some 4,800 rounds per hour. Certainly any area or strongpoint would be temporarily if not permanently out of action.

With the launchers and rockets available, this imposing addition to our fire power could be obtained by utilization of artillery manpower, by a temporary diversion from their normal tasks. The commander having decided on the targets to be attacked, the artillery staff draws an arc of 4,000 yards radius, its center being the target. The portion of this arc within our lines indicates the desired belt of positions for launchers (see Figure 3). The actual positions are determined by air photo reconnaissance, if available, followed by ground reconnaissance.

With the advent of a new organization, a Rocket Battalion, Motorized, 4.5-inch Rocket, Truck drawn, it will not always be necessary to draw personnel from other units. This organization, comprising forty officers and 627 enlisted personnel, should be capable of doing an excellent job with its own weapons as well as being qualified to train and demonstrate for other units. This unit, being specially trained, will presumedly be used as a part of corps artillery, and will be attached to the division most in need of their fire power to accomplish their mission. However, it is felt that they should be used a great deal to fully benefit the combat troops by their fire power. If they are to be used only sparingly, they will revert to such a specialized role as to have little actual value. A heavy ponton unit, for example, may be used only once or twice in an operation and then for only a few hours, yet they must be fed, clothed, and maintained during the whole operation. Thus, for the rockets to be of combat value they should be used extensively.

A further disadvantage is the inability to conceal the blast of the rocket as it leaves the launcher, necessitating movement of the launcher from position to position to avoid counterbattery and countermortar fire. This fact accentuates the use of a mobile base so that the launchers can be easily displaced after completing their mission.

Tested under actual combat conditions, the rockets gave excellent results but immediately drew counterbattery and countermortar fire, inflicting casualties. This bore out the need to make this weapon highly mobile, by mounting it either on a vehicle or on a mobile base

of its own. The rockets must do their job and move out immediately or expect heavy fire from enemy guns.

Both the Navy and the Air Force have used rockets extensively, the Navy to pave the way for amphibious landings and the Air Force to augment their planes' fire power and to make them a more potent war machine.

The Navy has mounted clusters of rockets on many types of their landing craft, even establishing rocket ships, to precede the assault troops toward the beach, and with the offensive fire power available in the rockets, will clear the beach of fixed defenses and destroy or drive to cover any enemy personnel present, allowing the assault troops to establish a beachhead before the enemy can reorganize his position. Here again no effort is made to effect accurate results, but dispersion and the staggering of the boats, plus a heavy mass of fire, will normally enable an effective coverage.

The Air Corps has found that it can mount rockets on its fighter craft, outside of the normal bomb racks, beneath the wings, and then by merely pointing the plane at the target, get excellent results. Reports from various theaters state that after a few flights the pilots get excellent results and the planes' fire power and striking ability is greatly increased. The firing of the rockets does not affect the flight of the plane. They may be fired in single bursts or by ripple fire, and once the projectiles have been fired the launchers may be released from the wing and discarded in flight, returning the plane to its normal combat role. Pilots report that they have dealt heavy blows to enemy material through the addition of this weapon.

Ground forces' use of the rocket has not been extensive due to its newness and the need for the removal of some of the bugs that undoubtedly will appear with further usage. However, tests have given excellent results, convincing all concerned that this weapon has great possibilities as an area weapon.

Although it may appear that the disadvantages outweigh the advantages of this weapon, such is not the case. For the type mission assigned to it, it does an excellent job, it gets excellent effect in woods and hedgerows, and its mass of fire is capable of complete neutralization and destruction of an area. The attempt to compare the fire and result of the rocket projectile against that of the artillery should be minimized. They are two different weapons with basically different characteristics, each capable of doing its assigned task in an efficient manner. Thus the point of comparison should be ignored, placing each on a level with the other. The field artillery has a new member in its family, and we bid it welcome.

Japanese Prisoners for Cash

From *Netherlands News* 1 February 1945.

CAPTURED Japanese soldiers have become a substitute for currency in the eyes of the Papuan natives of one of the liberated Netherlands East Indies islands.

One group of Papuan chiefs recently approached an American intelligence officer on their island and asked him how much he offered for Japanese prisoners "in good condition" and were told that the current bounty figure was five guilders (about $2.70) each. The chiefs held a brief consultation and decided the price was too low. A few days later, the same group returned to find a different officer in charge of the allied headquarters. This time they received an offer of ten guilders per head, and within a few hours they returned with a dozen captured Japanese. An American patrol followed the Papuans to their village and found there a stockade filled with Japanese who looked well-fed. The Papuans drew on this human "bank" —which they kept extremely well guarded— whenever the market price quoted was high enough.

The Development of Air Transport

LIEUTENANT COLONEL J. D. BERRY, *Air Corps*
Instructor, Command and General Staff School

THIS present war is the only one in which the civilized world has been engaged that air transport has played such a vital role. True, this has been only the second major war fought since the advent of the airplane. Prior to World War I, man had conquered the air only to the extent that the airplane could carry one or two passengers and no freight of any great bulk. Certainly, not much thought was given to the airplane as a freight carrier. Prior to World War I, some individuals who thought the "flying machine" might possibly be used for observation and artillery spotting were considered dreamers. Although World War I demonstrated that the airplane was destined to have many uses, it is very doubtful that any but a very few far-sighted individuals saw the air transport possibilities.

Let us see what happened during the peacetime years between World War I and the present war in the air transport field. In the early twenties neither the military nor the commercial aviation did cargo-carrying to any great extent save for the air mail service which was inaugurated in 1918 by the Military Air Service. Until 1925, when a new postal law was passed allowing the Postmaster General to contract for the carriage of mail by air, the civil air firms could not attempt any long-distance operations. The years immediately following passage of this postal law saw great development in the civil aviation field both in passengers and mail carried. It was during this period of 1926 to 1930 that commercial aviation really got its start and began to think of designing and developing aircraft which would carry large amounts of mail and freight as well as several passengers. From these thoughts the present Douglas C-47's, C-54's, and Curtiss C-46's were developed. When this present war started, our domestic airlines were operating with 359 airplanes, most of which were DC-3's, commonly known to the Army as C-47's. After our entry into the present war a large proportion of these aircraft were taken over and operated by the Army Air Forces Air Transport Command.

In December 1941, when the United States entered the war against the Axis powers, we found ourselves with long, insecure supply lines against an enemy with short supply lines. We had a logistical problem on our hands which had to be solved immediately. In order to help solve this problem, air transport was called upon.

The organization which handled much of the air cargo at this time was the Air Cargo Division of the Air Service Command. The Ferrying Command was doing the job of ferrying aircraft to combat units here in the United States and overseas. They were also helping the combat units to get overseas quicker in unit airplanes. In April 1942 these two organizations were consolidated under the Ferrying Command, and later that year, in July, the Command was designated as the Air Transport Command; that name it still retains. At approximately the same time that the Air Transport Command was coming into its own, a new organization was evolved from the old Air Transport Wings and called the Troop Carrier Command. In some ways these two organizations had similar duties. The Air Transport Command was to be responsible for ferrying of aircraft, domestic transportation by air of supplies, and transportation by air of supplies to the overseas theaters. The Troop Carrier Command, on the other hand, had the job of transporting airborne infantry from their rear area positions to positions behind the enemy lines, and in addition had a secondary mission of transporting supplies by air within the theater. It might be said that the Troop Carrier Command is the theater airline and the Air Transport Command the War Department airline plying between the various theaters and the United States. In order to see what these two organizations have done to help solve our logistical problems and to help pave the way to victory, let us consider them separately:

first, the Air Transport Command, and second, the Troop Carrier Command.

The Air Transport Command, when organized in July 1942, had only four wings plus the domestic transportation division and ferrying division. The four wings controlled activities on the four major routes reaching out from the United States. These wings were the Caribbean, South Atlantic, North Atlantic, and West Coast Wings. From this start the Air Transport Command now has grown to ten divisions, each of which has wings of its own. During this growth, what has transpired in the Air Transport Command which will have had a bearing on this war's outcome? For example, when Rommel was pounding at the gates of Cairo, the British defense almost broke down for the lack of antitank-gun shell fuzes. A number of tons of these fuzes were urgently needed in order to hold the enemy back. At this time, the nearest supplies were in the United States. The only supply instrument which could deliver these urgently-needed fuzes was the airplane. So the Air Transport Command diverted a number of planes, and with a number of planes diverted by RAAF (Royal Australian Air Force), was able to deliver these supplies within three days and help turn the tide of the campaign. There are other examples too numerous to mention where urgently-needed supplies have been flown to our armies. Lest one think that the command hauls supplies only one way, consider the strategic materials which have been brought to the United States on return trips. In an eight-week period, the Command carried out of China thirty-two tons of bristles, seventy tons of silk, forty-seven tons of tin, and seventy tons of tungsten. Besides these strategic supplies that have been flown out of remote parts of the world, many wounded have been evacuated from the theaters to the United States.

This command has today developed into the largest air transport and ferrying system ever known. At present, ATC flies more than 50,000,000 miles a month, most of which is overseas or over foreign lands. Roughly, half of the flying entails the ferrying of military aircraft and half is in transport service. During the year 1944, the total mileage flown was in excess of 600,000,000 miles, equivalent to 25,000 trips around the world. It has transported on these trips more than 5,000 sick and wounded troops to the United States each month, and has flown over 1,500 pints of whole blood a day to the European Theater. Each month, more than 100,000,000 pounds of high-priority cargo, including 10,000,000 pounds of troop mail, are flown abroad. During the first six months of 1944, more than 15,000,000 pounds of strategic materials were flown back to the United States from abroad, a large percentage by ATC.

Now how about the Troop Carrier Command? Consider what has been done in the Southwest Pacific Theater by Troop Carrier. During the Buna campaign many tons of supplies were carried by air over the Owen-Stanley mountain range to troops fighting their way up the east coast of New Guinea. Paratroopers were carried into the Markham Valley of New Guinea, helping us drive the Jap out of that area, thus enabling us to advance our front line considerably. During the landings on Hollandia when it was impossible to move supplies from beach areas to troops, planes of the Troop Carrier Command carried food and ammunition so that the infantry could continue to move forward. This alone may not have saved the campaign, but it certainly contributed largely to its success. In the operations following the Hollandia operation up to and including the present Philippine operation, the Troop Carrier Command has figured materially in the carrying of supplies and evacuation of the wounded. The Southwest Pacific Theater is not the only place in which the Troop Carrier Command has figured. Consider the airborne invasion of Burma, the airborne invasion of Sicily, and the use of airborne troops in the invasion of Europe. Of course, it is too soon to say just how much all of these airborne operations have changed the course of the war, but it is certain that they have aided materially, and this aid has depended on air transportation.

Having considered our two principal air

transport units separately, let us examine some examples of the overall use of air transport. Possibly the best examples are to be found in those operations carried on in the India-Burma Theater and the China Theater. In those two theaters, air transport operations have reached a high degree of efficiency both in supplying our troops and in evacuating the wounded.

Before we consider the operations in India, Burma, and China, let us consider first that the Japanese conquest of Burma would have had a catastrophic effect on future Allied operations in the Far East had it not been for the possibilities of air supply. For just as the Japanese conquest of Singapore had blocked the sea routes from the west to China, so the Japanese occupation of Burma closed the land highway. The armies of Generalissimo Chiang Kai-Shek depended exclusively upon airborne supply for munitions which have enabled them successfully to resist the Japanese in China. The aerial route from Assam over the "Hump" to Kunming and other airfields in China held by the Chinese was developed from this need of supplies by the Chinese. It is easily recognized that this achievement of supplying one of our main Allies with the necessary weapons of war solely by air transport must be counted as one of the major contributing factors to the development of air transport in this war.

To illustrate further, consider that the first Wingate expedition into Burma in March and April 1943 was maintained completely by using transport aircraft operated by the RAF.

In the realm of casualty evacuation by air, it can easily be seen that this activity is, by nature, bound up with the growth of air transport, for when an aircraft has landed its supplies, the sick and wounded have highest claims for conveyance on the return journey. In the India-Burma Theater alone during the first five months of 1944, 23,209 wounded were flown from forward areas to base hospitals. When you consider the terrain in that part of the world, it can easily be seen that it is not conducive to ground travel. In all probability, many of those evacuated by air owe their lives to this air transportation of them when either sick or seriously wounded and unable to withstand the rigors of an overland journey from forward areas to hospitals in the rear areas.

From examples cited of operations carried on by the Air Transport Command and Troop Carrier Command using air transportation, it can be seen that this use of air transportation has helped to speed up the war, possibly to alter the course of the war, and at the same time to save many lives. If the speed and flexibility of air transportation had not been available, possibly the story of World War II might be a different one to tell.

"Taking the easy way out" has a bad reputation, because it's usually associated with a person who is lazy or weak and takes the easy way instead of the BEST way. But there are times when the easy way IS the best way. A good example of that is in the performance of Preventive Maintenance service in the Army. For it's a lot easier to tighten a few nuts than it is to replace a whole assembly that's been damaged because the nuts weren't tightened. It's a lot easier to keep a battery filled with electrolyte than it is to put in a new battery. It's a lot easier to keep a rifle clean than it is to fix it when it jams—especially if you're under fire when it jams! So here's your chance to do something you've always been told not to do—take the EASY way out. Use PREVENTIVE Maintenance.

—Maintenance Division, ASF

Pacific Strategy

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THE SITUATION

IN December, 1941, after consolidating her earlier gains on the Asiatic mainland in pursuance of her long-prepared campaign to enlarge her world position, Japan was prepared to take a further fateful step. The attacks on Pearl Harbor and the Philippines were followed by a rapid advance in China, French Indo-China, Thailand, Burma, Malaya, and the islands of the Pacific, toward Australia and the United States. By 31 July 1942, lodgments had been effected in the Aleutians, at Wake Island, and as far south as New Guinea and the Solomon Islands (see Figure 1. The numbers appearing in parentheses throughout this article are references to the circled numbers in Figure 1.)

While this situation has now been reversed, a resumé of the essential features of the Allied success is necessary to lay a basis for discussion of future strategy in the Pacific.

Initially, the United Nations recoiled before those attacks. Desperate naval battles marked the Allied retirement to the south, as area after area was lost to the Japanese advance. However, Allied strength was increased in Australia, and Alaska and Hawaii were reinforced. Wake was lost, but Midway was held, and a probable attack on the U.S. Pacific coast was frustrated.

On 1 December 1941 the Japanese held the areas shown in solid black in Figure 1. All hachured areas were still in their status of pre-war sovereignty. By the time of their farthest advance on 31 July 1942, the Japanese had seized control of the additional areas indicated according to the legend in Figure 1. At first the United States could only hold at all costs the line Dutch Harbor (Aleutians)—Pearl Harbor—Samoa, gather strength in preparation for an offensive, and meanwhile (in the main by submarines) destroy enemy shipping wherever found. But this situation gradually improved.

In April 1942, seven days before Bataan fell, the United States had occupied a base in the New Hebrides (1). After consolidation of the position in Australia, the Allies began the advance to the north and northwest. By 31 December 1944 they had seized the areas shown in cross-hachures in Figure 1. At the time of writing, Manila had been retaken, and it appeared that the Philippines would now become the base for a further advance.

The Allies' advance acquired momentum in 1944, when numerous powerful accretions of fleet strength made their influence strongly felt. The table of "Important Events in the Allied Advance in the Pacific" at the end of this article shows the critical steps taken, chronologically, during the great advance. It was island-"hopping" and "skipping" with a vengeance. The first consideration was to seize air fields or deny them to the enemy, then establish forward bases for sea and land forces. Numerous enemy positions not required for overall purposes were bypassed and contained or kept under observation.

Frequent naval engagements of all degrees of importance marked the progress of the campaign. Few of these are listed in the table of "Important Events in the Allied Advance in the Pacific," but it is essential to note that a vast overseas movement, with much sea and air fighting, was necessary to establish our forces in the South and Southwest Pacific in adequate strength, and to consolidate the defense, prepare the attack, protect it phase by phase, and ensure its success.

Our position in Guadalcanal, becoming precarious after the initial occupation, was, for example, secured and extended through expenditure of much of our naval strength, particularly in aircraft carriers. It is the production of our present great fleet which has made and still makes success possible. And hand in hand with this goes the whole pattern of the developed art of amphibious war, the organization and training of our vast Army, and the accomplishments of our home economy.

With the capture of Mindoro and the seizure of Manila early in 1945, the question becomes, what next?

Relative Fighting Strength

Of all the elements which play their part in the struggle of the Pacific, logistics is recognized as the dominant factor—on the assumption, of course, that personnel problems do not become critical. The basic factors in the logistics situation are geographical and economic, the former being the primary consideration.

Geographic Factor

Geography, in the effort of the United States to deal with Japan at the center of Japanese power, is definitely on the side of Japan. The real bases for Allied action have been America and Australia, and the distances are stupendous.

Figure 2 shows the geographic situation in graphic form. Two replicas of the continental United States could be contained between Manchuria and Oregon; four, between Singapore and Panama. Singapore is, in fact, as far from New York as the North Pole is from the South Pole. Manila is one-third of the earth's circumference from San Francisco. San Francisco is four times as far from Manila as is Tokyo. Manila is 600 miles from Formosa and Hong Kong,

Figure 1.

and 1,000 miles from Shanghai. Tokyo is:

3,500	miles	from	Hawaii
2,000	"	"	Kiska
1,400	"	"	Guam
1,700	"	"	Manila
1,900	"	"	Hong Kong
1,100	"	"	Formosa
1,000	"	"	Shanghai
900	"	"	Seoul (Korea).

Nagasaki in Kyushu (southernmost island of Japan) is 150 miles from Korea and 500 from Shanghai. Saipan in the Marianas (23), our last great conquest before we leaped to the Philippines, is as far from Tokyo as New York is from Havana.

Furthermore, as the advance continues, we encounter larger land areas which contain larger garrisons and require more land, sea, and air power to reduce. It is true that we gain accretions in power through opening up communications to friendly populations and sources of needed raw materials. But we lengthen the lines of communications to our home base.

In the Central Pacific our line leads from Pearl Harbor westward through Kwajalein (16) and Eniwetok (18); thence to Guam, Saipan (23), and the Palaus (26); thence to the Philippines (see Figure 1). From Australia and New Caledonia the lines run north and northwest via Port Moresby and Guadalcanal (2), Bougainville (12), and the New Guinea coastal ports to Morotai (28) and so to the Philippines.

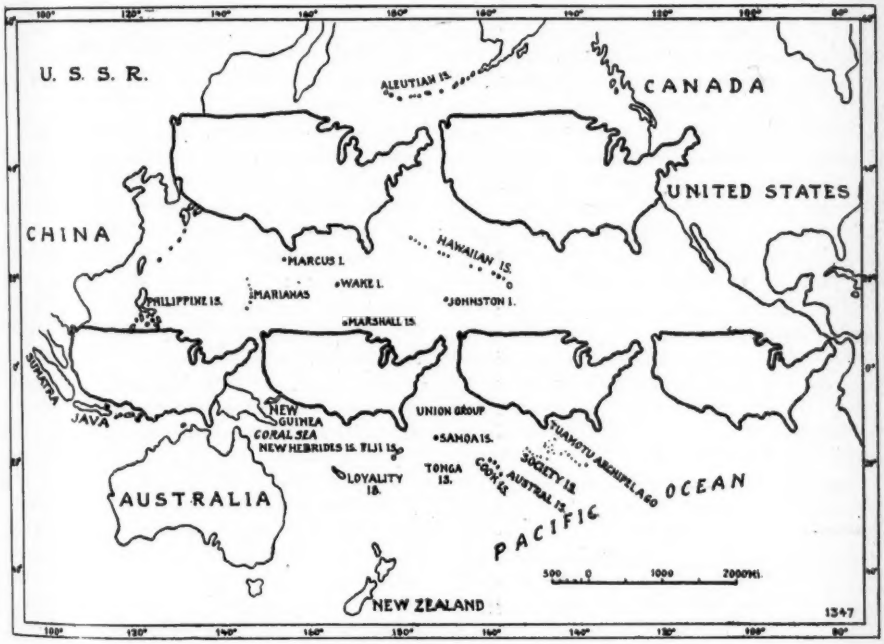


FIGURE 2.

Along the line of advance via these communications we have bypassed some fifty enemy bases and left upwards of 250,000 Japanese in our wake. These Japanese are colonizing and consolidating their positions. While starvation and disease have taken a toll, this trend will probably be reversed. Though the bypassed enemy are a nuisance

rather than a threat, they are farming and breeding, and eventually will require specific attention.

Some of these "skipped" islands require forces in containment as well as observation. The "hopping" of the great base at Truk (17) provided an answer to one of the engrossing pre-war strategic problems—could it be done and, if so, what would follow? The Japanese cannot be left in indefinite possession of Truk or of other bypassed positions. The ocean lines of communication will have to be improved for purposes of future strategy, and for this reason and for eventual purposes, Japanese still in occupation will have to be cleaned out.

Japan's vital life is lived in her "inner citadel"—her home islands, Korea (next door on the mainland), and Manchuria (north of Korea). As things now stand, her outer defenses have been penetrated, her inner ring of defense has been seized in part, but her innermost fortress is intact.

In China, the Japanese recently opened a land route south to their southern conquests. Moreover, they seized most of the available U.S. air bases. Long ago, they cut the Burma Road, drove the Allies out of Burma, and forced them to supply China precariously by airplane over the "Hump."

Recently, Japan suffered a major defeat in Burma. There were serious losses in men and planes, coincidentally with the loss of the Marianas. Her expulsion from Burma may be confidently predicted—probably soon. But, while the Burma-Ledo road, winding thinly for some 1,500 miles over mountainous terrain from India, has been opened and convoys have reached Chungking, expectations are that, at its best, supply from India will not exceed that provided over the "Hump." The improvement of Indian railways, which earlier lost men, materials, and rolling stock to Iran, will not alter the situation at this bottleneck.

When Japan loses her ocean routes from Burmese and Chinese ports, she can still draw supplies by land. The rail net is good enough, and that leading from China into the inner citadel is being double-tracked. Already our fleet has attacked Formosa and the Chinese ports, and is tightening its grip on Japan's classic communications in the South China Sea; but Japan's interior lines grow shorter as her outer empire contracts.

In pre-war days the future logistics problem in the Far East was always recognized as calling for a great expansion of facilities on the U.S. Pacific coast. Owing to the limited western port facilities and transcontinental communications, the great port for supply of the Pacific war has been always the same as for war in the Atlantic—New York City. This situation is being met by vast construction on the west coast.

And this expansion can scarcely be too great. The geographic approaches to Japan have been the subject of continuous public discussion. One route leads from Alaska via the Aleutians and Kuriles. Another is via Siberia. The next (around the circle counterclockwise) is via China and Manchuria-Korea. Then there are the sea routes from the Philippines via Formosa-Ryukyus (29) and via the Bonins (24).

The Alaskan route has been frequently flown by U.S. planes to bomb Paramushiru (25a) near the southern tip of Kamchatka (see Figure 1). However, the climate and weather are unfavorable for operations, the land areas are small, and further development of Alaskan bases could only make operations feasible on a relatively minor scale.

The Siberian route is feasible for large forces, though climate and weather are not so favorable as farther south, but this whole matter is a problem as to Russia.

China and Korea-Manchuria afford possibilities of great base establishments and the expansion and extension of existing communications among friendly populations with important native resources which could be profitably denied to the enemy and used for our own strategic purposes. The route brings up abruptly against Japan's western moat—the Japanese Sea, but there are relatively narrow water-spaces and numerous small

islands. The whole approach is far from easy, but it is a feasible route with fewer disadvantages than any other.

The island routes from the Philippine area involve small land areas (even Formosa is relatively small) with limited possibilities of development. Possession of these points would assist invasion of Japan, but would scarcely make it feasible on any acceptable basis of consequence, except as to relatively minor efforts.

Whichever of these routes will be used, or for what purpose each will be used, is so largely a matter of logistics that the economic factor becomes determining.

Economic Factor

The special logistics problem of the Pacific war may be presented in terms of shipping. Where one operation requires 100 cargo ships over a three-month round trip while another requires 200 over a six-month period, the demand in the latter case is quadrupled.

Where a round trip from the United States to Europe may take sixty-five days, five months are required in the Pacific to ports in China, Burma, or India, which means only two departures per ship from the United States per year. For the African landings, the distances were from 1,500 to 4,000 miles, but the 500 ships cleared from dozens of ports. The large ports of Oran and Algiers could not originally handle more than forty ships a month (some sixty-five was the requirement for this campaign); yet they are larger than comparable ports in the Pacific.

For each soldier put ashore on a Far Eastern beach there is a requirement of five to ten tons of cargo, 700,000 different items. To take care of some 250,000 men requires 5,000 separate beachings and from thirty to thirty-five Liberty ships for maintenance of thirty days—also, fifteen tankers. Initial tonnage of supplies and equipment for such a force equals one and a half million tons, while thirty days' maintenance runs the total nearly to two million.

A force of half a million men requires four million square feet of open storage space (ninety-two acres) and three and a half million of covered storage (seventy-nine acres). Such a force needs unloading facilities for three-quarters of a million tons of shipment a month after initial equipment is ashore. Ship requirements are sixty-eight per month, with port facilities for them.

Great as the Marianas effort was, it would have been necessarily far greater had not the Japanese been simultaneously occupied with the major campaign (previously mentioned) in Burma. This effort and the British naval strength in the Bay of Bengal have put a real strain on Japanese naval resources and communications.

It has been estimated that it costs us sixty-four times as much to fight in the Philippines as it costs the Japanese. Japan is believed to be self-sufficient as to food stuffs so long as she can draw from Korea and Manchuria. The isolation of Formosa would not be fatal, though it would cut off almost all of Japan's sugar and six percent of her present rice supply. Her food supply would be comparatively unaffected by any blockade south of Formosa. To be fully effective, a blockade of food stuffs must cut Japan off from Korea (only 150 miles distant), across an island-studded strait whose eastern coasts are fully protected unless the Sea of Japan is penetrated.

So far as Chinese sources are concerned, Allied occupation of China would progressively deny foodstuffs to Japan, but her situation would never become critical, for this reason, until the Allies deny her the use of Korea.

As to metals, Japan has plentiful native coal, but her coking-coal comes from her inner defensive zone on the continent. So do her best iron ore, and much of her other essential supply of metals. However, she has stock-piled supplies intensively in her home islands. It is true that shipping losses kept her from bringing much of her booty home—but she has nevertheless done pretty well for herself in most commodities. While her inner citadel lacks bauxite (for aluminum), oil, and rubber, and is deficient in lead and nickel,

Japan possesses estimated stockpiles for:

Aluminum (bauxite and alumina)	6-18 months
Chromite	1 year
Copper	1 year 5 months
Magnesium	6 months
Manganese	2 years
Molybdenum	1 year
Mercury	2 years
Lubricating oil	18 months
Fuel oil	5 months

Japan will need less oil as her empire contracts. She will probably "get along pretty well" in this respect. Even when cut off from overseas oil, manganese, lead, nickel, and aluminum, she will be far from helpless, and her situation will still be favorable as to tungsten and chromium.

FIGURE 8.

The best estimates seem to give her enough aviation gasoline for one to two years, enough rubber for five plus (and she probably has plenty), and enough tin for eight years or more. The amputation of Manchuria and Korea would be necessary for serious starvation of her steel industries. All in all, she can get along pretty well for quite a while after the war is carried to the outer end of her drawbridge. If steel is the critical index to her endurance, she can endure a great strain for some years.

Japan's essential industrial plant is largely in her home islands—mainly near Tokyo Bay (in the area: Osaka-Kobe-Kyoto-Nagoya); in northern Kyushu; and on the western coasts of her main islands (Figure 3). This location is vastly to her advantage. The B-29 raids are affecting this plant, but cannot be expected to destroy it. Nothing like the round-the-clock bombings of Germany is possible as to Japan until enormous Allied air bases are set up near by on the continent. From Saipan to Japan (as already noted) is as far as from New York to Havana.

Japan is now believed to have adequate plants for a considerable increase in production of planes, tanks, armored cars, trucks, and ordnance. She can replace planes at a rate equal to recent Allied destruction. *On the basis of the present scale of military-naval operations,* she can probably support them for an indefinite period. Economic strain, alone, will not cause any serious lowering of Japanese industrial capacity. Her electrical resources are adequate. So is her rail net.

Japan's war production is probably capable of increasing her war supplies of nearly every category. It is true that her production cannot equal that of the Allies. (The U.S. alone produces 8,000 combat planes per month, in contrast to Japan's 1,400-1,500.) But, on the other hand, Japan's industries are not within the present range of Allied intensive air attack. This would require great bases 500-600 miles from Japan's shores, and China is 1,200 miles from Tokyo. The only way to acquire such bases is to operate via Siberia or China.

Japanese merchant shipping has been reduced at a rate fifty percent greater than her replacement ability. Sinkings are at a rate of one and a half million tons a month, while replacement is estimated at a rate of one million a month. But requirements will

decrease as her sea communications shorten.

While it is true that the measure of Japanese production is her pre-Pearl Harbor plant and not her later conquests, her plant is well protected on her island home, and its capacity will probably equal demands for some time to come, even on the basis of a major defensive effort.

Military-Naval Factor

The Allies have proved their ability to coordinate their thrusts by land, sea, and air. As the advance in the Pacific has proceeded, a definite pattern has become discernible. The rate of advance, viewed from the possibilities as judged in pre-war studies, has been miraculously fast since the moment when the great new fleet of the United States was able to take to the waters. This is the outstanding overall accomplishment—particularly as to new battleships, carriers, airplanes, and supply ships.

The next most remarkable accomplishment has been in the development and use of amphibious equipment. This whole art, kept alive by the Marine Corps in the many years of stagnant interest, took a sudden spurt along correct lines in 1942, and has made notable progress.

Invention has played a major role, not only in the realm of matériel but in that of personnel. New aircraft of carrier-based types and improved design; new carriers, large and small; giant land-based airplanes; the vast new battleships, inevitably Queens of the Sea; new landing craft; new vehicles and new weapons (or adaptations of old ones)—these are all examples. In the logistics realm, the Quonset hut was a notable contribution, and especially the sectional steel ponton, with (of course) the adapted bulldozer and its new relative the "tankdozer." Whatever the difficulties of completing the war with Japan, it can be expected that American inventive genius will materially reduce them.

Invention in the personnel field, as well as in matériel, has been effective. The "Seabees" (Naval Construction Battalions) have been a "natural"—a blend of enthusiasm, specialization, expert adaptation and artisan's knack. The amphibious successes in the Pacific are largely due to this "invention." The Army's amphibian engineers are another example. All the pattern of personnel and matériel for the rapid establishment of bases ashore was essential to the actual accomplishment.

The "air landing strip," simple as it is, has the touch of real genius. It has reduced the pressure on the naval carrier, and has vastly facilitated the forward projection of operations.

As the campaign has proceeded, naval air strikes and gunfire, bombings by land-based aviation, and covering actions of all types by air, surface, and sub-surface forces have preceded, flanked, protected, prepared, and supported the landing attacks at each stage. Gradually, the Services have learned Joint Action. A slowly-appearing but skilful blending of all means of action, according to their inherent characteristics, has been evident, land artillery and ships' gunfire becoming more and more of a team, in concert with aircraft of all usable categories, while the rocket, the mortar, the amphibious truck, the amphibious tank, and the soldier and sailor themselves have been welded into a single multiple weapon.

Allied shipping and shipping production are equal to the expected task, though after the defeat of Germany it will take months to divert the ships in Europe to the Pacific in any volume.

Latest estimates are that all available Allied troops will be needed, after war in Europe is over, to finish the Pacific war. U.S. fleets are being augmented, and reinforced by strong British naval forces.

The Japanese troop leadership in the higher grades is estimated to be inferior; but, while their forces have been out-maneuvered and out-fought at sea and on the islands, they have shown desperation and calculated daring, and have come narrowly close to decisive successes. They are not expected to deteriorate so long as they have the means to fight.

The Japanese are reported to be reducing

the disparity existing to their disfavor in the technical performance of aircraft. They are improving armament, range, speed, and load capacity. Japan can now mass her air force.

The Japanese fleet is still powerful, protected by a strong air force. While Japan's power of offensive strategy has been lost beyong the range of her land-based aircraft, that range will be adequate for a strong defense. Losses of five planes of theirs to one of ours may not continue at that rate in the future.

Of her Army of four million men, less than one-third have been used south of China and Formosa. Her best troops have not yet entered the fight in numbers. Japan can embody some three million more men in her Army, and the men are available.

Psychological Factor

What the Allied position will be, psychologically, on conclusion of war with Germany, is one of the major questions now being publicly discussed. The United States intends to finish the Pacific war thereafter as soon as practicable, on the basis of destruction of Japanese war power. What Russia will do is a question. The Japanese believe that political divergencies of aim will weaken the Allies, and that the American people will slacken effort by reason of economic readjustment and war weariness.

The best sources believe that the Japanese people will not "crack" and that only utter physical destruction or exhaustion of men or materials will defeat them.

Japan sees favorable elements in the situation despite Allied success. For the invasion of Europe, planning had to be done one year ahead of action. Traffic regulation, ship loading—everything had to be checked and rechecked. And Asia is 1,000 miles instead of a few score miles from the nearest Allied base. Japan counts on her interior lines. It took the Allies well over two years to accumulate their stockpile of supplies in the United Kingdom. How long will it take in Asia?

The psychological effect of the end of war in Europe may favor Japan. She will gird herself for the test.

Her manpower situation is favorable. Her Army is not yet at full strength. She has four million men under arms, two-thirds of them in China and in her inner citadel. Two million fit men, available, have not been called up; one and a half million more are available, seventeen-twenty years old. (The U.S. has for some time been calling up its eighteen-year-olds.) The normal replacement rate is 200,000 to 250,000 per year; the annual loss does not equal this rate.

Enemy Plans

The original Japanese objective in the war is generally recognized by good authorities to have been the establishment of suzerainty over an extensive, populous, and prosperous empire in East Asia and the South Seas, in order to enable Japan to consolidate her position and gain power for her avowed purpose to rule the world.

Japan has failed in her larger effort, but she is not expected to abandon it. She will hold fast with all her strength to all that she can save of what she has, while she develops strength to try again.

Offensive action on any great strategic scale is out of the question for Japan, for a long time to come. Her only feasible plan of action is a flexible, elastic, mobile defense, to maintain her inner citadel (at a minimum), and as much more of her gains as she can. Raids as far east as the California coast are a possibility yet. Submarine activities against Allied communications should increase. Thrusts against our fleets are still possible. Great land offensives and counteroffensives on the Asiatic continent are to be expected. But all, however powerful locally, will be essentially defensive in purpose.

Allied Plans

By contrast, the Allied strategy must be offensive on the vastest scale. As to how to apply Allied strength to *destroy Japan's military power* or at least reduce it to comparative helplessness, the answer of the highest U.S. authority has been—by *every* possible way.

Possible ways discussed in this connection have been:

1. Air attack.
2. Blockade by air and sea.
3. Land attack via:
   a. Kuriles
   b. Bonins
   c. Formosa and Ryukyus
   d. Siberia
   e. China.
4. Combinations of the foregoing.

No one now seems seriously to believe, after the experience with Germany and in view of the distances involved, that Japan can be decisively defeated by air attack alone without, first, a great land campaign on the continent.

No one, however reluctant to expend forces otherwise, appears now to believe, with any authoritative basis, that Japan can be defeated by blockade from sea or by air, alone or together. While the margin is narrow, Japan can live and fight until denied all her mainland conquests, and thereafter for years unless she is seriously attacked and forced to expend her resources in an all-out defense.

Land attack via the Kuriles, Aleutians, and Alaska holds out no promise of major success. The logistics possibilities are too inadequate for the attack. The land areas are too small for necessary stockage of supplies and deployment of other means. The weather is unfavorable, and the whole project is regarded as infeasible except as a secondary effort or a profitable diversion.

Except as to the weather, much the same can be said of the routes via the Bonins and Formosa. Possession of these areas will hurt Japan and help the attacker, but a descent on Japan proper by these routes offers no prospect of employment of sufficient force, adequately supported.

Siberia raises the question of Russia. With Russian assistance, the effort can be much eased.

China is the only answer for a major offensive to wreck Japan. Access to China's resources in land, raw materials, population, facilities, and communications is absolutely essential. There never was, in fact, any other answer to this problem, unless, indeed, Russia would play a major role. Over the years, the strategic situation has never essentially changed in that respect.

The use of China's facilities demands seizure of a coastal area, and that of Hong Kong and Canton may be visualized as the most suitable for that purpose.

Conclusion

To seize such a beachhead, fight off the desperate Japanese counterattacks, build up a vast stockpile of supplies, and, by any or all of the best available routes, penetrate Manchuria and Korea and then Japan proper, is the route to Allied victory. To this end, establishment of a great Allied land base for sea, air, and land forces on the Chinese coast is the logical next major objective.

Important Events in the Allied Advance in the Pacific

Event	*Date*	*Circled Numbers in Figure 1*
Occupation in New Hebrides by U.S.	1 Apr 42	1
Occupation of Guadalcanal-Tulagi by U.S.	7-9 Aug 42	2
Occupation of Milne Bay, New Guinea, by Japan	25 Aug 42	3
Occupation in Ellice Islands by U.S.	2 Oct 42	4
Occupation of Amchitka in Aleutians by U.S.	12 Jan 43	5
Organized Japanese resistance ended on Guadalcanal	9 Feb 43	2
Occupation of Russell Islands by U.S.	21 Feb 43	6
Occupation of Attu by U.S.	11 May 43	7
Occupation of New Georgia group commenced by U.S.	30 Jun 43	6

Battle of Salamaua-Lae begun, northeast coast of New Guinea ---------- 30 Jun 43---11
Occupation of Kiska by U.S. ---------- 15 Aug 43---8
Further occupation in Ellice Islands by U.S. ---------- 28 Aug 43---4
Occupation of Baker Island by U.S. ---------- 1 Sep 43---9
Allied landings at Huon Gulf, New Guinea, and Buhan River, New Georgia ---------- 3 Sep 43---10 and 6
Capture of Salamaua, northeast coast of New Guinea, by Allies ---------- 11 Sep 43---11
Capture of Lae on New Guinea by Allies ---------- 19 Sep 43---11
Capture of Finschhafen, New Guinea, by Allies ---------- 22 Sep-2 Oct 43---11
Allied Occupation of Treasury Islands off south end of Bougainville Island ---27 Oct 43---12
U.S. landing at Empress Augusta Bay, Bougainville ---------- 1 Nov 43---12
U.S. occupation begins in Tarawa, Makin, and Apamama Atolls in Gilbert Islands ---------- 20 Nov 43---13
Allied landing at Arawe, New Britain ---------- 15 Dec 43---14
U.S. landing at Cape Gloucester, New Britain ---------- 26 Dec 43---15
Allied landing at Saidor on north coast of New Guinea ---------- 1 Jan 44---10
Occupation of Majuro Atoll in Marshalls by U.S. ---------- 31 Jan 44---16
(This was the first pre-war Japanese territory taken by U.S. forces.)
U.S. landing on Roi, Namur, and Kwajalein in Marshalls ---------- 1 Feb 44---16
Heavy surprise U.S. naval blow at Truk in Carolines ---------- 16-17 Feb 44---17
U.S. occupation of Engebi Island in Eniwetok Atoll of the Marshalls ---------- 18 Feb 44---18
U.S. invasion of Eniwetok in the Marshalls ---------- 19-21 Feb 44---18
U.S. occupation of Los Negros in the Admiralty Islands ---------- 28 Feb 44---19
Occupation of Mindiri, thirty miles west of Saidor ---------- 4 Mar 44---10
Invasion of Manus Island, Admiralty group ---------- 14 Mar 44---19
First land-based air attack on Truk ---------- 15 Mar 44---17
Occupation of Gasmata, south shore of New Britain ---------- 16 Mar 44---14
U.S. occupation of Emirau Island, seventy-five miles northwest of Kavieng in New Ireland ---------- 19 Mar 44---20
Landings at Aitape and Hollandia on north coast of New Guinea ---------- 20-23 Apr 44---21
Ujelang Atoll in Marshalls occupied ---------- 23 Apr 44---18
Allied occupation of Madang on north coast of New Guinea ---------- 24 Apr 44---10
Occupation of Wakde Island off north coast of New Guinea ---------- 16 May 44---21
Landing on Biak Island off north coast of New Guinea ---------- 27 May 44---22
U.S. landing on Saipan in Marianas ---------- 14 Jun 44---23
Iwo Jima and the Bonins bombarded by air ---------- 14 Jun 44---24
China-based B-29's bomb Yawata, steel center on northern Kyushu ---------- 15 Jun 44---25
(First attack by land-based planes on main Japanese islands. Paramushiru [25a] in the Kuriles north of the main Japanese islands had been bombed for the first time by B-25's based on the Aleutians on 10 July 1943, and thereafter.)
First stage of the Battle of the Philippine Sea (our sea forces covering the Saipan landing) ---------- 18 Jun 44---30
(Aircraft of Task Force 58 now began their frequent attacks on Japanese sea forces, shipping, and land areas.)
Noemfoor Island, west of Biak Island, occupied ---------- 1 Jul 44---22
Saipan captured ---------- 8 Jul 44---23
Iwo Jima bombed for first time by land-based aircraft ---------- 13 Jul 44---24
Guam captured ---------- 20 Jul-9 Aug 44---23
Tinian seized ---------- 23-31 Jul 44---23
Air strikes at Palau, Yap, and Ulithi ---------- 24-27 Jul 44---26

Landings at Amsterdam and Middelburg and at Cape Opmari, near Sansapor in northwestern Vogelkop ---- 29-30 Jul 44---27
U.S. landings on Palau Islands ---- 14 Sep-14 Nov 44---26
U.S. invasion of Morotai in Halmahera Island ---- 15 Sep 44---28
Carrier air strike by U.S. on Formosa ---- 11 Oct 44---29
U.S. landing on Leyte ---- 19 Oct 44---30
Second Battle of the Philippine Sea ---- 22-27 Oct 44---30
First B-29 raid on Japan from Saipan ---- 24 Nov 44---23
U.S. invades Mindoro ---- 15 Dec 44---31

Armored Infantry

From comments by various commanders of an American armored division in Italy on lessons learned during the period May—10 June 1944.

Infantry-Tank Training.—During the last operation (from the time of the breakthrough at Anzio until after the capture of Rome) it was found that combined infantry-tank training cannot be stressed too much. The recent training of this regiment (——Armored Infantry) with armored elements of the division proved to be of great value. This was shown by closer cooperation, and better understanding of capabilities and limitations of troops, weapons, and equipment of the other unit. However, it is felt that while close support of tanks, medium or light, is desirable, it was found not to be always practicable. In most instances it is found that tanks, either light or medium, have maneuvered or moved forward faster than foot troops can advance. By lingering and waiting for infantry to mop up, the tanks expose themselves unduly, and if the tanks continue on, enemy infantry will rise up and a regular infantry battle ensues, thereby breaking up tank-infantry teamplay. This was remedied by using medium tanks for the assault punch and attaching light tanks to the infantry to assist in mopping-up operations. It is felt that permanent tank-infantry teams, training together and used in combat together, will bring closer cooperation.

Half-Tracks.—Normal use of half-tracks is to carry personnel to a vehicle assembly area where personnel dismount and move forward on foot. In a fast-moving situation where only rear-guard action is encountered, it was found best to move vehicles up to the line of resistance and dismount from there. As the attack progressed, the vehicles continued to move forward. When local resistance ended, the half-tracks were immediately available to expedite rapid movement forward of the column.

Pursuit Formations.—Where rapid advance is anticipated, more serious thought and planning should be given to road priorities and alternate routes of advance so as to aid in eliminating confusion in the column. It is believed flying columns or advance guards should be smaller. The roads available should be the determining factor in number of small columns employed in advancing through a sector. The following formation is recommended where resistance is likely to be spotty or light:

1 platoon of medium tanks
1 section of tank destroyers
1 platoon of infantry (or a company less two platoons)
1 section of engineers
1 company of medium tanks (less one platoon)
1 company infantry (less one platoon)
1 section artillery
Main body

In pursuit, it is essential that a part of the attacking unit be prepared to enter into a fire fight as soon as fired on. This fire will act as covering fire for maneuvering units and allow them to close in on the enemy more rapidly.

Segmental Air Interdiction

LIEUTENANT COLONEL GRAVES H. SNYDER, *Air Corps*
Instructor, Command and General Staff School

SUPERIOR Private Sukiyaki was hungry. Nothing but rice was a tiresome diet, and furthermore there had been little of that recently, nothing like in the old days. These past few weeks he had, he remembered, been hungry all the time. His company commander had given the men a talk just yesterday about the glory of sacrifice for the Emperor, and had implied that it was unworthy of a soldier to let a little thing like a period of reduced rations bother him. Perhaps it was the heat that made him so listless. The captain had also again cautioned the command about conserving ammunition. Sukiyaki fingered his few remaining rounds. He reflected that in case of an enemy attack he would like to have more. The enemy artillery and mortar fire which had been falling most of the morning in the area some distance to his left seemed to be increasing in volume. The Japanese fire in return seemed to be meager.

Suddenly, rifle fire from the Japanese outposts to his front broke the comparative quiet of his position. It was answered by shots farther in the distance from across the gully.

By that afternoon the outposts were being driven in, because of lack of ammunition. Sukiyaki had problems of his own. The enemy was apparently building up in the defiladed areas down in the gully. From the amount of small-arms and mortar fire coming into the position of his company, Sukiyaki concluded the enemy must not be as short of ammunition as he was. The mortars of his company had been dropping a few into the gully but apparently they were husbanding their ammunition until the situation clarified. Some of the enemy began to work their way up the hill. The Nambu (light machine gun) on his left flank fired short bursts when the enemy showed himself. A man on Sukiyaki's right went down. Sukiyaki replenished his dwindling ammunition supply.

By late afternoon the gunner on the Nambu was calling for more ammunition; he didn't seem to be getting any. The commotion on the left where so much artillery fire had fallen during the morning was considerable; could he be right in believing that it now came from his left *rear?*

When they came to the village, Sukiyaki pulled himself wearily into the truck. He was still hungry. He had five rounds for his rifle; the rest had been turned over to the covering force when the withdrawal started just after dark. Since then he had marched for about two hours. The truck moved off. Sukiyaki slept.

Was that firing? Sukiyaki jerked awake. No, just the truck back-firing. What was the matter with it, anway? They coasted to a stop off the side of the road. "Out of gas," the driver said, and by way of apology added that his truck was not the only one.

They marched all the rest of the night. Before he went to sleep in the morning, Sukiyaki could see that they were on the reverse slope of a hill at the foot of which the road crossed a river. Or did it? The truss of the bridge was buckled and lay in the water at a crazy angle. Men were working alongside it to construct a temporary bypass bridge.

Late that afternoon he was awakened by the sound of aircraft. They were attacking the bridge site, coming in low, firing their machine guns and then letting go with bombs. There were several explosions. The airplanes were gone; so was the partially completed bypass bridge. Sukiyaki was glad he did not have to build bridges. It must be discouraging work.

That night he was put on an ammunition-carrying detail. The only way to get ammunition forward from the other side of the river was by hand. When he arrived at the bridge site he found that a small foot suspension bridge had been thrown across the river, which was not so wide but appeared to be both swift and deep. Construction of the bypass was again under way. They proceeded with their task of carrying the ammunition across the small footbridge. Some men were trying to rig up a small ferry alongside them to supplement their efforts.

He had been at it for about two hours. It was not, he decided, pleasant work. Each box seemed to be heavier than the last. Just as he passed the center of the bridge there was an explosion. His footing seemed to be falling from under him; he was going over backward. The box of ammunition struck Superior Private Sukiyaki in the face just before the water closed over him.

Is the case of Sukiyaki and his bridge an isolated case? No. If we were able to view the whole theater from some point in space we would find many bridges, rail as well as highway, destroyed. We would find this destruction in depth and laterally across the enemy's entire communication system. We would see the same frantic efforts at repair or construction of a bypass. Aircraft would daily attack undamaged bridges or those under construction. During the night, delayed action bombs would cause further damage. Aircraft would be roaming the railways and highways between these destroyed bridges shooting up and bombing railway rolling stock and motor transport. As a result, the enemy communications have broken down. His front-line troops are short of everything. When pressure is put on him by our ground troops he cannot long resist it, but must give way because he does not have the wherewithal to fight.

Is all this "bridge busting" a haphazard operation or has it been logically planned to accomplish a desired result? Let us examine it from our viewpoint.

Disruption of enemy communications is a part of our doctrine and is stated in FM 100-20, Command and Employment of Air Power, as coming under second priority Tactical Air Force operations. This is sometimes called "isolation of the battlefield." This doctrine is applicable to all theaters. However, let us consider in this case only the situation where there is a sizeable land link in the enemy communications system. The most vulnerable part of the enemy's communication are usually the bridges in his rail and road net. These, then, are logical targets. There may be others, such as railway tunnels, but let us for purposes of illustration stick to bridges.

Certain factors as outlined below will favor and make easier the execution of this type of operation:

a. Where the enemy cannot live off the land and must bring supplies up from some distance over the rail and road net to his rear.

b. Where there are relatively few suitable railways or highways leading from his rear to his front.

c. Where there are few lateral communications and the main rear-to-front routes are separated by terrain obstacles.

d. Where the supply routes cross numerous rivers with vulnerable bridges or where there are other vulnerable bottlenecks in the system.

An example of a location where such favorable conditions exists is Burma.

The decision having been made to employ this form of attack against the enemy, it may be carried out by what we may call "Segmental Air Interdiction." The Tactical Air Force staff planning the operation would first gather as much information on the enemy communications system as possible and prepare a map showing the rail and road net with all the vulnerable points specifically located. Detailed information on the type of construction of each bridge would be obtained through aerial photographs. The plan could then be prepared to provide:

a. Two or more lateral lines of interdiction chosen so as to require the least effort in cutting each route and to divide the communications system into segments.

b. Destruction of any rolling stock or motor transport trapped within the segments.

c. Reconnaissance for results and provision for re-attack and mining with delayed-action bombs to prevent repair or construction of bypass bridges.

d. Reconnaissance for changes in vulnerability and defense, and revision of target selection in view of this information.

e. Attack of rolling stock and motor transport on active routes until those routes

are cut in order to hinder their use as by-passes into otherwise isolated segments.

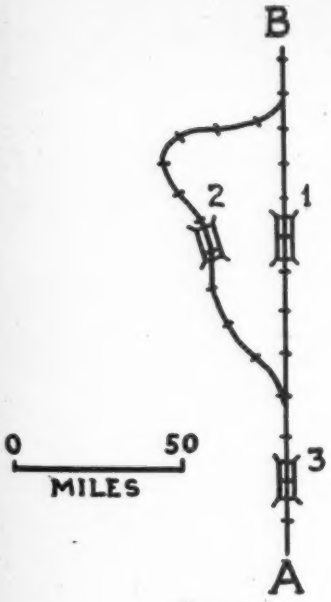


FIGURE 1.

Let us consider separately each of the above provisions. Referring to Figure 1, suppose we wished to cut the rail connection between A and B. We can do this either by destroying bridge 3 or both bridges 1 and 2. At first glance it would appear that bridge 3 should be the choice as requiring the least effort. But this requires a judgment based on accurate information of the relative vulnerability of the three bridges. The question would have to be worked out jointly between A-2 and A-3. Possibly bridge 3 is a massive structure heavily defended by antiaircraft, while bridges 1 and 2 are of less sturdy construction and undefended. Possibly bridge 3 is beyond effective range of our aircraft. These things must be considered before we can say that our "line of interdiction" should cut the route between A and B through bridge 3 or through bridges 1 and 2. Everything else being equal, it should cross at bridge 3 in order to "require the least effort."

Referring to Figure 2(a), we have an idealistic system with the line of interdiction AA. This cuts all routes, but each only once. The enemy still has the capability of unloading south of the cut, getting his supplies across the river by whatever expedient possible, and transshipping forward. It will hamper him

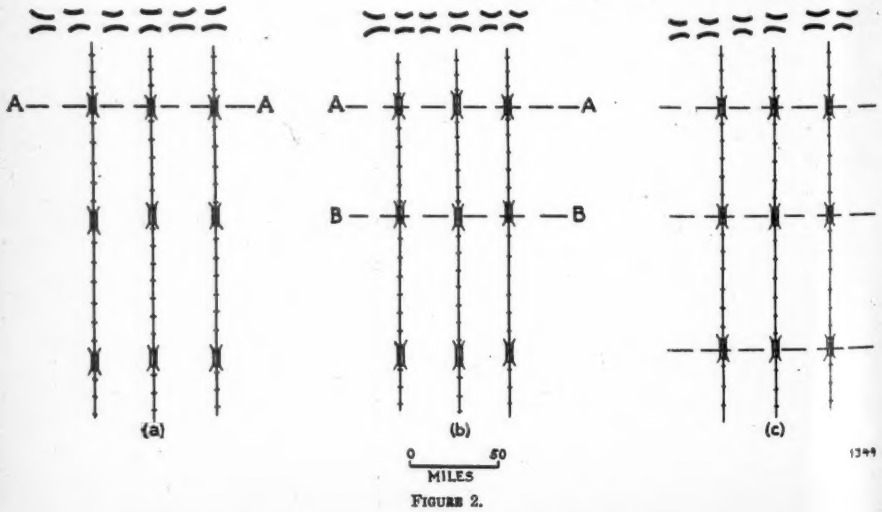


FIGURE 2.

but it will not hamstring him. By adding the line of interdiction BB as in Figure 2(b), we have isolated a segment of his communications system between the two lines of interdiction AA and BB. This will force him to transship twice, but that is not the main advantage to be gained by segmentation. By creating this isolated segment, we have trapped within it such of his transport as happened to be there at the time the last cut was made. If our lines of interdiction are complete, he cannot bring additional transport into the segment. Then by a systematic application of *b*, above, "destruction of any rolling stock or motor transport trapped within the segments," we really put him in a bad way. He cannot transship. He may get some supplies across the line BB, but to move them forward he has no transport and must fall back on men or animals, neither of which are immune to harassment. Figure 2(c) simply illustrates a refinement by the creation of two segments.

Reconnaissance must be conducted on those bridges attacked to ascertain the amount of destruction. If the bridge is not cut, then we will have to attack it again to finish the job. When destroyed, it must be kept under surveillance. When faced with this type of systematic destruction of his communications, the enemy will expend great effort to repair the damage or to construct a bypass or ferry in order to move his supplies forward without transshipping. Before he can succeed in this, we must attack again to nullify his efforts. It has been found effective when attacking his construction work to mix bombs with long delay action fuzes with those of normal fuzing. Some of these long delay bombs may fall in the water and their non-detonation may go unobserved during the general confusion of the attack. By attacking in the late afternoon and fuzing these bombs to go off at intervals during the night, construction can be greatly retarded.

Bridges which have been selected for destruction but not yet attacked must be kept under surveillance also. Perhaps an increase in the antiaircraft defense of some target may make it advisable to attack some other bridge along the route instead. Or the enemy may actually build a bypass bridge before the main bridge is attacked. This means, in effect, that to cut the route at that point we must destroy two bridges. Possibly again it will be cheaper to run our line of interdiction

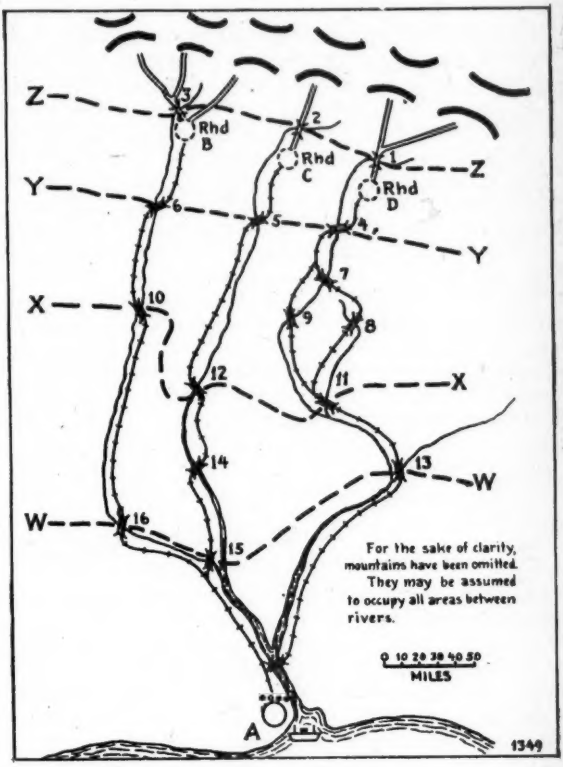


FIGURE 3.

where it crosses that route through a different bridge.

We must keep a record of the results of all this reconnaissance which will show at any time the status of each bridge which is a part of the plan, whether already destroyed or under consideration.

Until the plan has been completely executed there will remain some segments which have not been completely isolated due to an uncut route leading into them. The enemy will try to make this route do the work of the others in bringing supplies into the segment. To prevent this we must patrol these routes, destroying any rolling stock or motor transport found. This operation is normally carried out during daylight by fighter type aircraft. If we make it too dangerous for the enemy to move during daylight, he will still attempt to move at night. We must plug this leak for our interdiction to be completely effective. Some success has been had in this respect by patrolling the uncut route at night with bombers, usually mediums or lights.

Figure 3 illustrates what a map showing lines of interdiction might look like. In conjunction with this map, the record previously mentioned showing the status of each bridge must be kept up to date. This map shows four lines of interdiction. These are probably more than are necessary and might well be reduced to three in order not to absorb too large a part of our available force in this particular operation. It can be seen that there are several choices as to just where we can have our lines of interdiction cut the routes. Line XX might cut route AC through bridge 14 instead of 12 if this would involve less effort. Again, line YY might cut route AD through bridges 7 and 9 or 8 and 9 instead of 4. Such a decision can be based only on actual knowledge of the relative vulnerability of the respective bridges as determined from current intelligence.

Although Sukiyaki was not in a position to see what was causing him and his pals so much trouble, it should now be clear that he was the victim of a coordinated plan of the nature described.

Quartermaster Intelligence Teams

From *Quartermaster Training Service Journal* 19 January 1945.

QUARTERMASTER Intelligence Teams, following the wake of battle along the western front, report that the quality of captured enemy equipment shows the strain under which the German industrial machine is laboring.

The intelligence team consists of one officer and two men sent out by the Office of The Quartermaster General to collect and study captured enemy equipment.

Articles which may have use-value to the Allies or have special significance to G-2 are sent to the U.S. and to Britain for further study. Similar teams are operating in other theaters.

The Allies learn much about how things are going in Jerry-land from this equipment: what material shortages exist, the status of German industrial manpower, and trends in enemy equipment. A change from leather to cotton webbing in cartridge belts, etc., may indicate that the Reich doesn't have as much livestock to slaughter as formerly, and therefore, not as much meat to eat.

The enemy equipment serves a second important function. It often gives us good ideas about equipment which we can improve and put to use. An illustration of this is the now-familiar refillable water and gasoline cans. Used by the Germans in North Africa, the merits of the containers were quickly recognized by us and put to use. The new U.S. intrenching tool (M-1943) is based upon a type developed by the Germans.

Under Fifth Army a Division G-4 Operates

MAJOR GEORGE H. REVELLE, JR., *Infantry*
Headquarters Fifth Army, Assistant G-4

IT was near the beaches at Salerno, Italy. The Division War Room had been established in a storage tent. Inside, around the operations map, stood the G-2, G-3, G-4, and the Chief of Staff. The moment was silent, tense, awaiting the return of the Division Commander with directions from General Clark, Commanding the Fifth Army, and the Corps Commander. Operations in Italy were about to begin for the division. What would be the first task assignment? What would the General want?

Suddenly the tent flap flew open and in strode the Division Commander in his usual firm, sure manner. The group snapped to attention, stepped aside, and waited expectantly while the General took a seat before the map. He studied it for a moment, turned his head, and said, "G-4! Get me a grease pencil so that I can look like a Commanding General."

That was the first G-4 problem. Thus began a campaign of battle under Fifth Army that subjected the divisions of that command to nearly every conceivable type of operation with its consequent administrative and supply problems. Ensuing months brought bitter fighting in the ever-present mountains, above and below the snow line, through forests, swamps, and streams; then came innumerable river crossings against well prepared defenses; also, approach marches, relief of one division by another to continue the assault; amphibious operations at Anzio—four months' defense of positions similar to trench warfare of World War I; breaking of "impregnable" mountain "lines"; capture of the large modern city of Rome; pursuit of a beaten enemy northward; and successful breaching of the "Gothic Line." In the future looms the crossing of a large defended natural barrier—the famous Po River. What hasn't the Fifth Army met in the way of operations? Jungle operations! Yes, but little else.

These conditions have made every Division G-4 in Fifth Army an improviser, an operator, and a wiser man. Manuals, text books, teaching, and training served their purpose. The basic principles (to use a cliché) remain firm and sound. They assume, however, real meaning in actual experience. Few changes have been found necessary in principles, but the actual adaptation has given them new meanings not visualized in study or training. Details of how to accomplish the basic rule assume large proportions. The lessons learned consists of practical hints which, in retrospect, seem simple and logical. They are a result, however, of laborious experimentation, trial, and error. A discussion of these problems and their solution by Fifth Army Division G-4's may prove of assistance to divisions to follow. Those divisions recently arrived in Italy and now making their record have benefited greatly thereby.

ORGANIZATION

It being generally true that the first step in accomplishing a military task is the acquisition and organization of personnel and equipment, an examination of how Division G-4's in Fifth Army solved this problem is pertinent to the understanding of their solutions to all problems that have confronted them.

Tables of Organization and Equipment have provided the basic means at G-4's disposal. He has the Special Supply Staff and its agencies and equipment, and he has his own office assistants. There were as many different methods of organization as there were units, before their participation in combat. Similarly, combat organization varies in details according to the various personalities involved, from the Division Commander on down. In spite of these variances, certain principles have been generally adopted by all.

The Division Headquarters itself is a monster unrecognizable to those acquainted with it on paper or maneuvers. First of all, it is normally increased in personnel due to the more or less permanent attachment of small detachments. The total size of these "attachments" exceeds the Headquarters itself. For example, there are the many G-2 "auxiliar-

ies" such as CIC (Counterintelligence Corps), Public Relations with ever-present reporters and photographers interspersed with scenic painters, photo-interpreter teams, Psychological Warfare Branch, a support control group, etc. G-4 occasionally has detachments of observers or Captured Enemy Matériel Teams. Secondly, due to the Theater and Fifth Army insistence that personnel records of all kinds be accurate and submitted promptly, personnel officers and enlisted men are assembled from all units assigned or attached to the division into one installation which is an integral portion of Division Headquarters. Needless to say, this vast number of personnel became too large and unwieldy for one or even two installations. No General will tolerate a large headquarters, especially in a division.

Accordingly, conceived during the Sicilian campaign and refined under Fifth Army, the Division Headquarters has been organized in three separate echelons entitled "Division CP" (Division Headquarters), "Rear Echelon," and "Administrative Center." The Division G-4 has his agencies variously located among all three.

The "Division CP" is generally composed of the Commanding General and aides, Assistant Division Commander and aides, Chief of Staff, G-2, G-3, G-4, Assistant Division Engineer, Signal Officer, one-half of the Division Signal Company, Provost Marshal, liaison officers from units, Headquarters Commandant (CO Special Troops), and necessary portion of Headquarters Company to administer and supply this installation. This portion of the Headquarters constituting the command group is located as far forward as defilade from light artillery will permit. An average distance is five miles from the "front." Efficiency of command outweighs the disturbance of occasional artillery harassment.

G-1, CWS, Ordnance Section, Surgeon (Division Surgeon and assistant only), Adjutant General representative, balance of Signal Company, G-2 auxiliary attachments, and necessary portion of Headquarters Company to administer this installation, including Headquarters Company supply, form the "Rear Echelon." This portion of the Headquarters is located between one and three miles in rear of the Division CP along the main supply route.

The third headquarters installation, called the "Administrative Center," is composed of the Adjutant Generals' section, unit personnel sections including company clerks from all units, APO, balance of Surgeon's section, Purchasing and Contracting Officer (QM), Special Service, Red Cross, Division Baggage detail, and balance of Headquarters Company providing mess and housekeeping. This unit is located wherever suitable buildings can be obtained. It is sometimes as much as fifty miles to the rear and seldom approaches within the corps zone.

During periods when the division is placed in a "rest area" for two weeks or longer, these three installations may be very close to each other, but their separate identity is maintained. The Chief of Staff controls the location of the CP, the G-4 controls the location of the Rear Echelon, and G-1 controls the location of the Administrative Center.

To round out the organization of the Division G-4's agencies, it must be pointed out that the Quartermaster is located with the QM Company, the signal supply with the Signal Company, the medical supply with the Medical Battalion, and the graves registration with the Quartermaster. In addition, the Division Transportation Officer and Dispatcher are with the QM or located separately along the main supply route where good truck standing is available.

Of course, variations in this organization are prevalent depending upon the particular unit or the *emphasis* being placed upon a particular problem at any one time. In one division the G-4 is located at the Rear Echelon, but the necessity for knowing what is planned or occurring requires that he be almost constantly at the CP. Thus, the difference here is essentially only in where the Division G-4 sleeps and eats and where his office business is conducted. For all other purposes he is at the Division CP during the most important periods of activity. An ex-

ample of variation according to emphasis on a problem is a situation where pursuit is involved and the cry for trucks, trucks, and more trucks is heard everywhere. Then it is advisable to have the Transportation Officer quickly available, so he moves to the CP. When the problem assumes its normal proportion the Transportation Officer returns to his usual location.

War Room

With this background of the Division G-4's organization, it is next important to place him in his normal surroundings. What, exactly, does he personally do? Out of this question has arisen the first real innovation in Division Headquarters and Division G-4 operation. The manual would state it:

"The staff assists the commander, to the extent that he may require, by providing information, data, and advice; by preparing detailed plans and orders in accordance with his directions; and by exercising such supervision over the execution of his orders as he may prescribe. A staff officer, as such, does not exercise command."

The practical method by which this objective has been *easily* reached is contained in the "War Room" and its corollaries. (For the purposes of this discussion, a complete description and definition of the "War Room" as developed under Fifth Army is not possible. It could be the subject of a long thesis in all its ramifications. Only those portions and functions important to the Division G-4 will be described.) The War Room idea was conceived from the necessity of establishing a separate planning group in the Theater Headquarters. When the 3d Infantry Division entered upon the planning of the Licata portion of the Sicilian operation, the Division Commander formerly connected with Theater Headquarters, set his General Staff aside from the CP to plan the operation. This worked so well that after the Sicilian operation the War Room was formed in the division as a combat necessity. Normal methods of entirely separate offices and records had not worked smoothly in Sicily.

In brief, the War Room consists of a storage-tent office or "nerve center" for the division. The Chief of Staff, G-2, G-3, and G-4 are personally in attendance during all periods of combat activity. In here are located the G-2 Situation Map; Tactical Reconnaissance (Air) Map, and air photos; G-3 Operations Maps (two); G-4 Administrative and Supply Map, overlays, and memoranda; Engineer Road, Mine, and Bridge Maps and information; G-1 battle loss and replacement reports; and the Division CP journal. All operational messages, communications, and telephone calls funnel into this center. All telephonic or written orders emanate therefrom. The maps and other information are maintained strictly "up to the minute," available for all to see.

Here, the G-4 participates in all planning and action. He knows, by listening and seeing, the entire division's present and future situation. Other staff officers and the Division Commander are fully advised of supply factors at the moment plans are being prepared. It is the final definition of the complete team in staff action.

The actual "work" of the General Staff sections is performed in the usual separate "office" located within the CP. Field Orders, Administrative Orders, and other memoranda are actually prepared in the G-4, G-3, or G-2 office under supervision of the assistants. Special Staff officers and subordinate commanders and staff are seldom admitted to the War Room to avoid crowding and confusion. G-4 meets with his special staff in the regular G-4 office. Similarly, with other sections.

This War Room enables the divisions to react with unusual accuracy, speed, and success from the moment an order is received from higher headquarters until it is transformed into action. Prior to the establishment of the War Room it was extremely clumsy and nearly impossible for the various sections to keep advised of the situation and to give the Division Commander the complete picture. As one G-4 put it: "The War Room is my crystal ball and horoscope."

Informed and led by the War Room, and with his agencies firmly organized, the Division G-4 moved in and out of intricate prob-

lems to successful solutions. Separate discussion will illuminate some of the solutions that were discovered.

MOUNTAINS

Summer and winter, there is no greater test of men, material, and ingenuity than combat in the mountains. Lucky is the Division G-4 who has trained Regimental Supply Officers and service units to respond to the unusual demands.

First and foremost is the need to supply battalions and regiments on high mountains inaccessible to vehicle supply trains. Here the renowned jeep met its master. At the moment, the solution is fairly complete, but in accomplishing this its evolution created special difficulties.

The answer, of course, is the mule—even the wizened, underfed, sickly Italian mule—that saved the campaign.

Divisions under Fifth Army first met the mule in Sicily. The General turned to his G-4 and said: "I've got to have 400 mules by tomorrow night! Then we can send the ——th Regiment over that mountain where the enemy doesn't expect us!"

Back to his office went the G-4 to marshal his forces. The army had no mules. Sicilian carts, scarce though they were in a war zone, were the only source of animals. The G-4 had men, trucks, and money to convert into mules. He called for his Quartermaster (the manual put mules in the hands of the QM), the Purchasing and Contracting Officer, and the Transportation Officer. When all were assembled, he put forward the proposition, discussion was had, and the following plan of action was initiated. Under direction of the QM, the Purchasing and Contracting Officer would obtain funds and parcel them out to all the QM officers available. Transportation would call in trucks from the units and QM Company. Each officer with two men per truck would take his money and a portion of the trucks to towns assigned to him. There AMG [Allied Military Government] and the local mayor would be mobilized to scour the countryside for mules. Sicilians live in towns and work in the countryside; thus, with luck, all farmers could be contacted. If an officer discovered more mules than he could send back in available trucks, he was to call the QM for more transportation. The system of paying cash was to be used in order to entice hidden animals from recalcitrant owners.

Two hours later these crews were on the way. At dawn the first calls began coming in. More trucks were dispatched.

During the interim, G-4 designated the Reconnaissance Troop to receive and outfit the mules, form pack trains, and report to the ——th Regiment S-4 at Service Company. The QM was directed to acquire pack saddles —an officer, money, and trucks were dispatched to Palermo. Some mules were known to be in an Italian Army dump captured several days before. The others? Time would tell. Next, forage must be acquired, and furnished every day as rations. A quick research revealed that the U.S. Army mule ate hay mixed with grain. Off went another group to acquire hay and grain. Rope was needed, and so the first officer who called for trucks got the mission of acquiring rope.

At noon, G-4 and the QM were at the bivouac of the Reconnaissance Troops when the first of the trucks and their sorry-looking mules arrived. Soon a flood of animals began to appear. Pack saddles came next, and then hay and grain. Injured animals had to be shot. The Division Veterinarian, who had done little but inspect meat for months, was busy in work he loved. Soldiers who had never been near a mule—or away from the Bronx—became muleteers. By dusk the pack train was formed and off to the ——th Infantry.

For the next few days the ——th Infantry was supplied by mule pack train. Forage and replacement mules were provided. Rations, ammunition, and water reached the forward battalions. The General's plan was accomplished.

From then on, this division insisted on having its mules ever available. In Italy their employment was almost continuous.

Fifth Army immediately saw the necessity and set machinery in motion (men, money, and trucks) to provide mules for all divisions. Thousands of mules were provided and main-

tained. Later on, Italian Pack Mule Companies were formed and attached to the divisions.

Familiarity bred more efficient employment and created known factors of supply. In this terrain, with scrawny Italian mules, a minimum of 500 per infantry battalion are required for maintenance of Class I and V for a distance (one way) of eight miles for a continuous action of seven days. At any one time in Italy, one division would have no more than four infantry battalions to support by mules. Others could usually be reached by jeep and trailer. It was not uncommon for G-4 to be supervising the supply of one regiment along a road suitable for all trucks; another regiment by 2½-ton truck to a jeep-trailer transfer point where supplies were transferred to a jeep-trailer and hauled over a trail behind a bulldozer, D-4, blazing the trail; and the other regiment by 2½-ton truck, to jeep-trailers, to mule, to consuming unit. This called for careful planning and coordination centrally controlled to make most efficient use of the means available. Shifting of means between regiments often occurred.

As Fifth Army progressed northward, more difficult terrain was encountered. Mules couldn't go as far as man. Division G-4's then had to use human supply trains. Service companies, headquarters companies, cannon companies, and reserve battalions were organized into porter trains. Fifth Army G-4 was called upon for assistance. Forthcoming were packboards manufactured in rear areas. With these, the load each man could carry to inaccessible places was increased. The combat units could take their weapons and be supplied from even more inaccessible places, to the complete stupification of the enemy. Alert G-4 planning enabled the objectives to be reached sooner and with less casualties.

Other variations were occasionally employed. Pack howitzers were used. Evacuation of casualties and the dead was carried on by mule trains. Some horses were even employed as cavalry on mountain reconnaissance. Veterinary hospitals made their appearance. Now, supply by mules is a common means employed in Fifth Army, with set procedures.

Mountains brought problems of equipment and loads for the individual soldier to the fore. Each pound of weight rendered the soldier less efficient. When the heights were first encountered, equipment began to be discarded if it met no immediate use—then later, when required, great cries of shortages were heard by the Division G-4. Also, long periods in high, cold altitudes called for unusual methods to bring equipment to the infantry. This demanded a complete examination of the clothing and individual equipment in the light of mountain requirements. In manuevers, the practice had been to have the soldier carry all the many items provided for his comfort, protection, and means to fight under any condition. Then too, the unit baggage acquired in days of inactivity became a burden to move.

It was decided what should be placed on the soldier, in his roll, and in his barracks or duffle bag. Under Fifth Army, resupply became so rapid and sure that the need for carrying reserves in division trains was practically eliminated. By experimentation, clothing and individual equipment were redistributed. In winter in the mountains the soldier wore wool drawers and undershirt, wool shirt and combat or wool trousers, sweater and combat jacket. On his back he carried his raincoat, overcoat or one blanket, entrenching equipment, shelter half, arms and ammunition, canteen and mess kit. In his roll were placed the other shelter half, pins and poles, two blankets, and complete change of clothing. This roll made a small enough bundle so that one jeep and trailer could haul the rolls for all the strength of one company actually in the forward lines. By this means it was possible for the roll to reach the soldier at least once every three days during periods of combat. When occasional three-day rests occurred, the entire battalion was able to go through a Fifth Army "Sterilization and Bath and Clothing Exchange Unit" where the soldier was bathed and received a complete change of clothing. With this distribution of items, there remained little to put in the barracks or duffle bag. This enabled the Division G-4 to reduce the allowance of bags to one per four enlisted men and thereby re-

duced tonnage and space required for division baggage, thus making it possible to deliver these items to the soldier more often. All other authorized items were turned in to Army Depot. As thus re-equipped, the soldier discarded none of the items—they were what he considered essentials, and so he kept them. From this, the Division G-4 learned to examine each allowance anew to judge its usefulness. Just because it was furnished or made available did not make it necessary at the moment.

River Crossings

This obstacle to the advance produces several G-4 problems and emphasizes in their solution three well established procedures.

No matter what the size of the river, the Division G-4 can be sure of two things if the obstacle is seriously defended by the enemy. One is that no General or G-3 will consider crossing with the materials organically available to the division; and the other, that unusual ammunition demands for heavy calibers will arise to allow a heavy preparation for the attack.

G-4's of divisions in Fifth Army have learned to watch the map ten to fifteen kilometers ahead of the current front lines. When a river appears across the route of advance, G-4 immediately goes into action. The first step is to check the G-2 map in the War Room and ask the G-2 if he believes that the particular river will be defended. The answer always being in the affirmative, he now has time in which to get most of the equipment G-3 will demand.

Time becomes important due to a factor not clearly seen until several unfortunate struggles to get extra equipment have been endured. Things are different than in the United States. There, higher headquarters can be considered as a large retail mail-order warehouse. Items can be obtained, if approved, no matter what or how many are desired. Unlimited resources are quickly available. In a theater of operations this concept is completely changed. Thousands of items are available based on strategic planning, but those items most desired by your General are difficult to seek out. The Division G-4 must give army time to acquire, construct, and deliver what is needed. Thus an early start on making requirements known is absolutely essential.

After G-2 says that he believes that the obstacle will be defended, it becomes incumbent upon G-4 to obtain the needs. The other staff members are more interested at the moment in the immediate battle, so it takes perseverance to get any decisions. Among items that have been required are life preservers, special assault boats, bridges, dukws, alligators, rafts, flame throwers (prepared positions), extra items for additional OP's, mine detectors, and thousands of feet of rope with buoys.

The final step is to inform the War Room what equipment they will have to do the job with when the time comes. In this manner, frantic searches and uncertain planning can be avoided.

To a Division G-4, all artillerymen and G-3's take fiendish delight at the approach of a river crossing. It presents an opportunity to them for the fanciest preparations possible. All types of explosive, including smoke, are always contemplated to be used. Therefore, G-4 makes certain that these needs are made firm, and corps and army have the ammunition available. The tendency of the artillery to increase stockages at gun positions should be resisted and carefully controlled. Otherwise, there will always be large quantities of unexpended ammunition to be moved when truck requirements are heavy.

On river crossings where only one or two bridges will be available for the division, it is most essential that plans be laid for early establishment of dumps on the far side. To this extent, a river crossing is similar to a shore-to-shore amphibious operation. Individual and unit reserves must be considered. Immediate movement of rations, gasoline, and ammunition to division dump areas on the far side is advisable. This prevents heavy traffic on the bridges. Normal procedure provides that trucks of the QM Company be loaded with two days of rations, 15,000 gallons of V-80, and small-arms (mortar and

machine-gun) ammunition. By this means, all tactical vehicles move across the obstacle without interference from any supply or water vehicles.

Strange as it seems, during the actual crossing, action must be initiated to collect all the miscellaneous items used for the crossing. Immediately after the combat zone lifts forward, the Division Quartermaster salvage detail (using civilian labor) scours the river for discarded items to return to stocks. This is G-4 insurance that items will be available for the next crossing.

Approach Marches and Pursuit

Rapid forward movement of the modern infantry division in approach marches or pursuit was forcibly brought to attention in the Italian campaign. The problem appeared in Tunisia and Sicily, but was not completely understood and solved until under Fifth Army.

No one realized the practical effect of motorization. The immense quantity of vehicles and the dependence on this equipment is never so clear as in the division area in mountainous terrain, whether one, two, or three roads are available to the division. Lack of control over this traffic will spell the difference between sluggish and effective operations.

Absolute, dictatorial control over all traffic movements must be exercised by a central division authority. Every division agency, therefore, becomes vitally interested in the policies and procedure. G-3 and G-4 are primarily interested—one to enable quick tactical reaction and the other to move supply and service as close as possible. This same need has appeared in both corps and army concerning the main routes.

Traffic uncontrolled in the divisional area is like the peacetime Sunday afternoon traffic on a main highway leading into a large city. From nowhere will appear hundreds of casual vehicles of the division or outside units proceeding on individual tasks of necessary and unnecessary nature. Such traffic cannot be eliminated, but it can be controlled.

As originally conceived, the division does not have sufficient means to handle this problem. Fortunately, however, other means are not fully utilized in their task and can be diverted. When not otherwise engaged, antitank companies and defense platoons can be converted to military police and traffic control personnel. Each officer of the division, when on the road, must be a self-appointed acting MP.

Most divisions have solved this problem in the following manner. A field officer is obtained for the General Staff and War Room. He becomes Movement and Traffic Control Officer. Under policies established by G-3 and G-4 combined, he is absolute dictator of the roads within the division area. The Provost Marshal and Engineer become his special staff for this purpose. Traffic control posts are established at the division rear boundary and all other critical points (crossroads, bridges, etc.) including an advanced TCP in the regimental area at the point where vehicles can proceed no farther. Each one of these posts is in direct telephone communication with the Movement and Traffic Control Officer. Roving radio patrols (SCR-193) patrol the routes. At his office, with the priorities established by G-3 and G-4, every single vehicle within the divisional area is controlled by use of the railroad type of "block system" control. Traffic is screened at the rear boundary and carefully routed throughout the entire area. As soon as the bulk of the division traffic is past any given point, whether it is the rear boundary or not, control is turned over to corps and the TCP leapfrogs to a new forward position.

Rules of the road are similar to those conceived in maneuvers—but they are really *enforced*. Woe to the individual who disobeys.

Thus, the modern division on wheels never gets snarled in its own traffic. It moves efficiently. The enemy cannot easily disengage in spite of demolitions and one-way roads. Too much emphasis cannot be placed on effective traffic control!

Amphibious Operation

Here is a subject from a G-4 point of

view that can only be well presented in a paper of considerable length. However, since amphibious operations have been one of Fifth Army's strongest weapons, and nearly every Fifth Army division has faced the problems, it is fitting to allude here to a few of Division G-4's troubles and solutions.

More than any other type of operation, an amphibious operation must be planned and prepared with extraordinary care. There is no means to correct mistakes once the operation is begun. G-4 is cut off from his base. He cannot go back to get anything in time to meet emergencies.

In addition to attention focused on all problems of supply and evacuation, an amphibious operation brings forth unusual problems concerning transportation. Combat loading, embarkation and debarkation, waterproofing, special items of equipment, handling of large amounts of supplies, Army-Navy cooperation, all are "G-4's problem." These are complicated, too, by the attachment—some for movement only—of miscellaneous units of all types due to the necessity of having them on the far shore with the D-day convoy. In some landings, task forces under command of a single division have increased the strength to 55,000; 30,000 is not an unusual number of troops under division control. All of these must be equipped, fed, transported, and supplied.

Foremost among methods to meet these conditions is the early reorganization of the Division G-4 Section itself. The assistant G-4 is detailed to join the planning group and, in conjunction with G-3, make all the detail plans for loading the entire task force. This G-4 representative must fit every bit of cargo and every vehicle into its appointed priority position. Embarkation memoranda must be prepared, beaches studied for plans of tactical development, dumps and installations must be located and published to all concerned.

Another officer must be provided to work under the G-4 as the Division Transport Quartermaster (TQM). Under him there are Group TQM's for each regimental combat team and similar group of craft. Still lower in the scale come TQM's for each ship or craft. Also in this organization must be an Embarkation Group to control the phasing of troops and supplies through the port of embarkation. This group remains after the departure of the D-day convoy and commands and loads the "follow-up" troops.

The waterproofing of thousands of vehicles requires the full-time attention of an officer representing the Division G-4, since "command decisions" must often be made to coordinate properly all phases.

The Division G-4 requires, in addition to the above, his normal office staff to carry on routine duties of supplying and re-equipping the division for its daily needs.

As with river crossings, an amphibious operation is the signal for everyone in the division to experiment and make demands for unusual items and amounts of equipment. Experience has proved that firm control must be exercised over this situation or the G-4 will be plagued until D-day with requests impossible to fill. There is, of course, a natural tendency to try to give a fighting man everything he thinks he needs. Such a policy, however, cripples the operation rather than helps it. The wise G-4, immediately upon notification of an impending operation, seeks out his General and gains his support for this plan: Publish a directive calling for submission of requests for items of equipment required in addition. The deadline date is carefully set beyond the time when the mission has permeated to battalions. When the reports are received, they are submitted to the General for his personal consideration. (He invariably adds a pet idea of his own.) The list is then published to the command as the *only* items that will be requested, without exceptions. Then stand fast on this position and enlist the aid of higher headquarters in acquiring the equipment.

Since, for the first seven to ten days of an amphibious operation, the division is cast loose from direct supply support of army, it is incumbent upon the Division G-4 to examine closely and load properly all supplies provided by army for this period. To

REDUCTION FROM ORIGINAL SIZE MAKES REFERENCE FRACTION INACCURATE HERE.

accomplish this, it is important that close liaison is maintained with Army G-4 and each supply service. Supplies actually loaded by the port or base section should be checked by division representatives. Then, and then only, can G-4 turn to his General and personally guarantee that all is sufficient and properly loaded.

Planning for debarkation must provide for the early phasing in of division service elements in order to establish control on the shore. On occasion, the Division G-4 must personally supervise shore activity to bring quick order out of the usual beach condition that always appears like chaos until men, matériel, and supplies are segregated. This action, and planning therefore, must be performed in view of eventual turning over of supplies and installations to fit into the corps and army supply and evacuation plan with minimum of readjustment.

Fixed Defense

Four long months at Anzio developed every trick of the trade to maintain a prepared defensive position. Normal operation up to this time had been under air superiority and with little regard for enemy observation. All this changed at Anzio. How did this affect G-4? It made a mole and improviser out of him.

Most difficult of all was the changing over of the habits of his services and unit supply officers. Previously, all operations had been in daylight. Rations, water, and ammunition were drawn during hours of daylight. Road movements were made within the capacity of the road net. Dust was an annoying but minor problem. Anzio changed all that.

Due to enemy observation, the majority of supply and evacuation movements had to be made in darkness. Those that did proceed in daylight had to be carefully regulated and screened. Night issues were the rule instead of the exception. Oil and water had to be laid on roads to keep the dust down, for any cloud brought an artillery concentration.

Emphasis was placed on getting underground and being camouflaged. This called for heavy demands for fortification materials; sandbags, lumber, wire, mines, etc., were always needed. Factors of quantities required were found to be correct but misleading. Every time that the lines moved forward or backward a small distance, new demands for materials had to be met. Every line achieved during a day had to be immediately and permanently developed. Thus, materials were obtained for many successive positions. This was a factor not previously considered.

While the defensive phase proceeded, the usual activity for preparation of an attack had to be carried on. Supplies were built up and equipment repaired and replaced.

There is no relaxation for a G-4.

Administrative Orders and Instructions

Rapid movement under normal conditions of aggressiveness of Fifth Army made several changes in the use of Administrative Orders as conceived before entry into combat. It was found to be physically impossible to produce and distribute a division Administrative Order before most of the information contained therein was out of date. Changes came too fast for the order to reach the individual to use its information.

Another factor that antiquated the Administrative Order was the high state of teamwork achieved by the division. Supply officers, services, and all concerned came to know that water points, clearing stations, truckheads, etc., would all be located along the main supply route within easy distance to all units. Signs were prominently displayed and even the most inexperienced truck driver could get on the main supply route and easily find any installation he needed. Close check on movement of installations is maintained by the simple procedure of the "customer" asking the "storekeeper" whether he would be at the same place tomorrow.

For these reasons, the Administrative Order appears very seldom in divisions of Fifth Army, and then only to make official written record or to establish supply procedures for an initial attack or amphibious operation. All other administrative changes

are announced by telephone or in the daily personal contact made by S-4's with the Division G-4 office or division services.

When an Administrative Order is used, it becomes even simpler than the fragmentary statements furnished in the manual. For example, the Administrative Order of the 3d Infantry Division for an amphibious landing involving a task force of 60,000 consisted of a one-sheet overlay (see page 57).

However, with the relegation of the Administrative Order to the background it was found necessary to publish memoranda of a "Standing Operating Procedure" nature covering all administrative subjects from "Property Responsibility" to what winter clothes would be issued. Fifth Army G-4 invented two convenient forms for these memoranda that have been adopted by the majority of divisions—(1) Administrative Instructions, and (2) Administrative Directives.

Those matters that should be brought to the attention of all units or personnel are contained in "Administrative Instructions." Those matters which are of interest only to the General or Special Staff and other selected individuals are published as "Administrative Directives." The same format with a consecutive numbering system for each is utilized. No other letters, memoranda, bulletins, orders, or circulars on administrative matters (G-1 or G-4) are published. Complete reliance on one type of document for this information leads to less confusion and better response to directives. These are recommended as universal forms.

* * * * * *

These have been some of the problems and reactions of a Division G-4 operating under Fifth Army—the first United States field army to function as such on the European continent in World War II. It has been, and continues to be, a large team of fighting divisions admirably led and supplied through every conceivable situation. Its soldiers have been fully clothed, fed, housed, and provided with the means to accomplish their task of liberation. Actual experience is the greatest teacher—witness the scene in the Division War Room again:

The Division Commander had been an instructor at the Command and General Staff School for a considerable time. One night before a particular attack, he and his General Staff had worked out the plan for the operation. Time did not permit issuance of a Field Order or Administrative Order; therefore, the regimental commanders, Divisional Artillery Commander, Assistant Division Commander, and General Staff assembled before the operations map in the War Room. The General began to speak, and there unfolded a plan that involved every element of the division. He traced the movements of each battalion to its objectives. Nearly two hours later, after questions, the meeting was over and the General and his G-4 were left before the map. He sighed, cocked an eye at his G-4, and said, "Well, at Leavenworth I would have given myself a 'U' [unsatisfactory] for that solution!"

Fortification is an aid, nothing but an aid, but a powerful aid to that strategy which seeks battle under the topographical conditions of the region.

After defeat in battle an army survives despite its losses in dead, wounded, and prisoners. An army, however, which immobilizes itself in a fort, great as it may be, is a lost army.

Fortifications, vast as they may be, are the tombs of armies, but that is not to say that fortifications do not serve their role with regard to armies.

—Marshal Foch

Ground / Air Planning

COLONEL JOHN W. HANSBOROUGH, *Field Artillery*
Commandant, Ground Liaison Officers School, Key Field, Meridian, Mississippi

Colonel Hansborough went overseas in October 1942 as the Liaison Officer from Headquarters, Western Task Force, to the XII Air Support Command in the invasion of French Morocco. He was later a member of the Artillery Section, Headquarters Fifth Army, and was on the planning staff for the Salerno operation. In October 1943, Colonel Hansborough pioneered in the organization of the Army/Air Section of Fifth Army. In July 1944 he and his section were transferred to Headquarters Seventh Army for the invasion of southern France. Some of the major operations in which Colonel Hansborough was involved in the ground/air planning were: bombing of Cassino, attack of the Gustav and Hitler Lines, break out of the Anzio beachhead, pursuit north of Rome, invasion of southern France, and the pursuit to the Belfort Gap.—THE EDITOR.

IN modern combat, basic plans of action are prepared weeks or even months ahead of time. Regardless of the level—army, army group, or theater—on which the plan is prepared, the Air Force must be brought into the planning in the initial stages. The initial planning on the part of the Air Force may include only a statement that the air can or cannot support the ground operation. Some basic considerations of the Air Force are:

a. Resources available in number and type of planes.

b. Supply of munitions, fuel, and maintenance items.

c. Replacement of flying personnel and planes.

d. Location of air bases and range of aircraft therefrom.

e. Degree of air superiority required.

f. Feasibility of isolating the battle area.

g. Requirements for photographic and visual reconnaissance.

h. In the early stages of planning, the Air Force is not so much interested in targets or specific objectives as they are in the logistical problems involved.

As the planning progresses downward from the theater level to army group and finally to army-Tactical Air Command level, the planning still remains on the broad basis of whether the Air Force can or cannot support the operation. At the army-Tactical Air Command level is the point where the details of the air action in the battle zone are worked out. Higher headquarters may, and in fact often do, handle the details of the first and second priority tasks for the air but the army and the Tactical Air Command do the detail planning within the battle zone.

We have said that no plan can be evolved without bringing in and considering the Air Force problems in the early stages of planning. We might also say that no tactical ground plan should ever be evolved which is dependent upon air action alone for its success. Of course, airborne operations are an immediate exception to this rule. However, there are many factors, such as weather, which can interfere with air action, and these must all be considered in the planning. Granted the elimination of the enemy air force, ground plans should be capable of success without the aid of air power. Air power may make the mission easier of accomplishment and reduce casualties, but it must not be depended upon to insure success.

The basic consideration in ground/air planning, in the battle area, is to so integrate the fire power of all arms that the infantry may advance rapidly with a minimum of casualties. The airplane, the artillery guns, the tank, the mortar, the infantry rifle are all means of developing fire power. Ground/air planning seeks to integrate, on the battlefield, these sources of fire power.

The airplane, as a source of fire power, has certain definite capabilities and certain very definite limitations. Let us attempt to compare the airplane to an artillery gun. You are all familiar with the characteristics of some particular gun. We might say that an

airplane is a weapon with the following characteristics:

a. Maximum range—300 miles.

b. Weight of projectile—1,000 pounds.

c. Probable error—300 yards.

d. Unstable firing platform.

e. Every shot a trial shot; fire cannot be improved by observation of preceding shots.

f. Capable of being massed and delivering a tremendous weight of explosives in a minimum of time.

g. Cannot sustain its fire.

h. Observation of target is essential.

Considering the above factors, it is obvious that we must make maximum use of the capabilities of the weapon and not select targets which only tend to emphasize its limitations. Its prime characteristics are long range, heavy projectile, and ability to mass in any area.

In the evolution of a Ground/Air Plan, certain definite steps are followed. The Air Force normally will do all planning and target selection in the accomplishment of its first priority task, destruction of the enemy air force. The Air Force takes the lead in the planning and target selection for the second priority task, isolation of the battlefield. However, close coordination is maintained with the army in this phase of the planning. The army normally takes the lead in planning and target selection whenever the Air Force is executing attacks in the immediate battle zone. The air works in very close conjunction with the army in the final stages of this planning to insure proper use of the air effort and that targets selected are suitable for air attack. It is on the army, therefore, that the problem of integration of all available fire power falls.

As we have seen above, the army must first decide what it wants before it is possible for the Air Force to enter properly the final phases of the planning. The army, in determining what it wants, will formulate an Army Plan, or series of requests, for the Air Force to execute. The formulation of the Army Plan is accomplished in the following manner:

a. Each division formulates a Division Plan which integrates certain desired air action into the Division Fire Plan. This Division Plan takes the form of a series of requests. The requests are placed in a priority from the division viewpoint. Each request includes a target, effect desired, and any limitations on the time of action. The division requests are sent to corps for consideration in the Corps Plan.

b. Each corps prepares a plan similar to the Division Plans. Corps considers the division requests and the desires of the corps commander in the formation of its plan. The corps must carefully integrate the Corps Air Plan and the Corps Artillery Plan. In general, the air should not be requested to attack a target which can be handled adequately by artillery. Corps submits its requests to army.

c. The Army/Air Section consolidates the various corps requests and prepares an Army Plan for consideration by the army commander. At this stage of the planning, the air staff is freely consulted by the Army/Air Section so that all selected targets are feasible of attack from an air viewpoint. The Army Plan, again, takes the form of a series of requests. Each request must include a priority, the effect desired, and any limitations on time of attack. After the Army Plan has been approved by the army commander, it is passed to the Air Force for action.

d. The Air Force blends the various targets of the first, second, and third priority tasks and, considering the means available, evolves a program of attack. The Air Force considers the various types of planes available, bomb loads, ranges, and other factors in the preparation of its program. The army is given a copy of the program so that all may be informed of the action which will be taken.

Again, I wish to emphasize that the final Air Force program is only one closely coordinated phase of a completely integrated fire plan worked out for an army or larger front.

The Physical Profile--An Element in Classification

Prepared by Personnel Division, G-1, War Department

SOMEWHERE in the Army a weary classification officer, reflecting on the woes of his job, began to draw what to him typified the Army classification system. He came up with what he humorously titled "Virus Classificomboobicus" and suggested that it was enlarged some two and one-half million times. The essential elements of this germ of classification, as he viewed it, were the qualification forms WD AGO Forms 20 and 66-1, AR 615-25, AR 615-26, and a long needle which he must frequently have used in selecting men who possessed the qualifications needed for a particularly urgent military job. He was perhaps correct at the time of his reflection in depicting classification in terms of these records, guides, and mechanical means of sorting. Meanwhile, changes have been introduced into the field of Army classification and its germ has adjusted to current requirements as it seeks to safeguard the selection of men for critical military assignments.

The newest major element of the classification system is known as the Physical Profile Serial. While this method, which will be described below, is basic in the assignment of men to military duties, it does not minimize the importance of occupational classification or the use of classification tests. Almost every man in the Army knows the difference between a Main Civilian Occupational Specialty and a Military Occupational Specialty, the former being the principal civilian job in which the inductee was engaged prior to military service while the latter is the military job in the performance of which the individual has achieved a degree of skill which qualifies him to become a member of a complex military team.

A typical main civilian occupational specialty may carry the specification serial number of 345 indicating that the holder was qualified in civilian life as a skilled driver of a light truck. A probable military conversion could produce for the individual a military occupational specialty of Tank Driver, Medium, with the specification serial number 2736. There are fewer military jobs than civilian jobs. However, many civilian jobs are grouped together under SSN 010, since they have no military counterparts, and at the present time there are approximately 534 MOS's listed and only 433 MCO's.

Within the operation of the physical profile serial, each of the elements of classification plays an important role in determining how and where an individual soldier can best aid in the accomplishment of the mission to which his unit is assigned.

One of the important factors which required consideration within the replacement system was the physical stamina possessed by men assigned to the Army Ground Forces. It became increasingly important, as we reached the lower extremity of the manpower pool, that those men assigned for duty with combat troops should be physically qualified to undergo strenuous training and to maintain maximum physical effectiveness throughout the arduous missions which have to be performed by the ground troops. Since the frequency with which men of this type coming through the Army was rapidly diminishing, the physical profile serial offered an easy but effective system of categorizing those men who could perform various tasks requiring different degrees of physical efficiency. Thus in the spring of 1944 the physical profile system as now in operation came into existence. The principal features of this new plan are contained in War Department Memorandum No. W 40-44, dated 18 May 44, and in the supplement to Mobilization Regulation 1-9 dated 22 May 44. The following paragraphs are quoted from the above memorandum:

"*Classification.* The initial classification of enlisted men in accordance with AR 615-25 [superseded by TM 12-425, 17 June 1944.—author] is an intelligent approach toward utilizing acquired skills effectively. Experience dictates, however, that to be most effectively utilized in the Army, the intelligence and skill of an individual must be

PHYSICAL PROFILE SERIAL

PHYSICAL PROFILE SERIAL

a	P	U	L	H	E	S
b	PROFILE SERIAL	PHYSICAL CAPACITY OR STAMINA	UPPER EXTREMITIES	LOWER EXTREMITIES	HEARING; EARS	VISION; EYES	NEUROPSYCHIATRIC
c	Factors to be considered.	Organic defects, age, build, strength, stamina, height, weight, agility, energy, muscular coordination, and similar factors.	Strength, range of motion, and general efficiency of upper arm, shoulder girdle, and back, including cervical thoracic and lumbal vertebrae	Strength, range of movement, and efficiency of feet, legs, pelvic girdle, and lower back.	Auditory acuity, and organic defects of the ears.	Visual acuity, and organic defects of the eyes and lids.	Emotional stability, personality, and neuropsychiatric history.
d	1	Able to perform maximum sustained effort over extremely ong periods.	Bones, joints, and muscles normal. Should be able to do hand-to-hand fighting.	Bones, muscles, and joints normal. Must be capable of performing long marches and continuous standing over long periods. No defects which disqualify for running, climbing, and digging.	Hearing 15/15 in one ear and 8/15 or better in other ear.	Meets general service standards of MR 1–9.	Emotionally stable, and those with transient, mild psychoneurotic manifestations incident to imminent departure for overseas assignment.
e	2	Able to perform sustained effort over long periods.	Slightly limited mobility of joints, muscular weakness, or other musculo skeletal defects which do not prevent— hand-to-hand fighting, and do not disqualify for prolonged effort.	 moderate marching, climbing, running, digging, or prolonged effort.	Minimum hearing 8/15 bilateral or 15/15 in one ear and less than 8/15 in other.	No intermediate grade. Use 1.	No intermediate grade. Use 1.
f	3	Able to perform sustained effort for moderate periods.	Defects causing moderate interference with function yet capable of sustained effort for short periods.		No intermediate grade. Use 2.	Below 1 but meets minimum standards for induction under MR 1–9.	Mild psychoneurosis other than 1 above or transient psychoneurosis of a moderate degree.
g	4	Below minimum standards for induction. Disqualifying except for those men who have been trained in and have performed adequately in current assignment.					

CHART No. 1 (Simplified)

supported and sustained by physical stamina. To assign men in accordance with their physical qualifications, assignment personnel need a simple code to indicate physical fitness. The term 'Physical Profile Serial' lends itself to better use than the word 'Code.'

"The objective of a physical profile serial is to provide a functional descriptive estimate of the soldier's general ability and personal fitness which, with his other qualifications, will be a means by which he can be effectively directed to a job assignment where he can best be utilized by the Army and to his self-satisfaction as well. [See Chart No. 1.]

"The Physical Profile Serial System is based primarily upon the function of various organs, systems, and integral parts of the body. Since the analysis of the individual's physical and mental status plays an important role in his future assignment and welfare, not only must the functional grading be executed with great care but also clear and accurate descriptions of his physical and mental conditions are essential. In developing the system, the human functions have been considered in six categories. For ease in accomplishing and applying the profile system, these categories have been designated PULHES. [See line *a* of Chart No. 1.] The factors to be considered, the parts affected, and the bodily function involved in each of these categories are as follows: [See line *b* and *c* of Chart No. 1.]

"There are four grades in each of the six categories. [See lines *d* to *g* of Chart No. 1.] For ease of application and to assure uniformity of recording, the first two grades are considered to represent a high level of physical fitness. Mobilization Regulations 1-9 may be used as a guide in considering certain defects. For this purpose, the first two grades may be considered as representing the general military service category. Grade three generally represents individuals with physical defects which, due to impairment of function, prevent the individual from being classified for general military service but are considered acceptable under induction standards for limited service. Grade four represents defects that are below the minimum physical standards for induction."

Chart No. 1 thus offers a grading chart for estimating the physical man, his general stamina, his arms, his legs, his hearing, his vision, and his emotional stability. To be rated as profile A, a man must be at least grade two in general stamina and hearing and grade one in the four other items. To be rated as profile B, a man must fall below profile A and must be at least grade three in stamina and vision, and at least grade two in the rest except emotional stability where he must rate one. To be rated as profile C, he must fall below profile B, but must be rated at least grade two in hearing, grade one in emotional stability, and grade three in the rest.

Chart No. 2 shows physical profiles A, B, and C graphically. The numerical equivalents or profile serials would be 211211, 322231, and 333231. It is apparent that the profile A man is the "superman" or the "commando" type who is able to perform maximum sustained effort over *extremely* long periods. The profile B man is the average or slightly above average man, sound in mind and limb, able to perform sustained effort over long periods. The profile C man has one or more physical impediments but they do not disqualify him for certain types of military duty. Below physical profile C is the man who would not be inducted into the service, but if he falls below profile C while in the service he may be retained if he has been trained in and is performing adequately in his current assignment. Letter suffixes to the profile serial are used to indicate special information; thus suffix X means the individual has served overseas, R means he has remediable defects, and D means that he is permanently disqualified for overseas duty. In the profiling of enlisted men at hospitals, Reassignment Centers, and Redistribution Stations, the S factor may drop as low as three and yet warrant the retention in service of the individual.

Obviously, such profiling requires careful examinations by experienced medical officers. At best the initial profile is only an overall

estimate of physical condition. Actual performance is the real test. A man's profile should be changed as his physical condition improves or deteriorates as provided in the cited memorandum. A profile is initially made and recorded at a Reception Center, is verified or corrected at or near the completion of basic training, and is brought up to date on release from any hospitalization he may experience in his service. The initial profile may be verified by observation of actual performance of duty and further medical inspection. The profile plan offers a simple and rapid method of assigning large numbers of men to those military occupations in which their general physical condition and stamina will permit them to function most effectively. Thus to be an infantryman in combat the man should have an A profile; for a supply job in the rear areas, he could have a C profile. For the most efficient use of our limited manpower, the A profiles should be used only in such arduous assignments where a B profile would not do. In general, the A profiles tend to go to the combat areas, but a certain minimum number of them will be required for the more difficult jobs in the supply lines. Thus, in general, from a given group of enlisted men of say 20,000, the ground forces and the service forces might each require one half; or 10,000. For the ground forces it might be desirable to assign eighty percent or 8,000 with A profiles while the service forces might require only forty percent or 4,000 with A profiles. Obviously, to do this, the 20,000 enlisted men for the ground and service force groups must have included at least 12,000 men with A profiles, or sixty percent of the total.

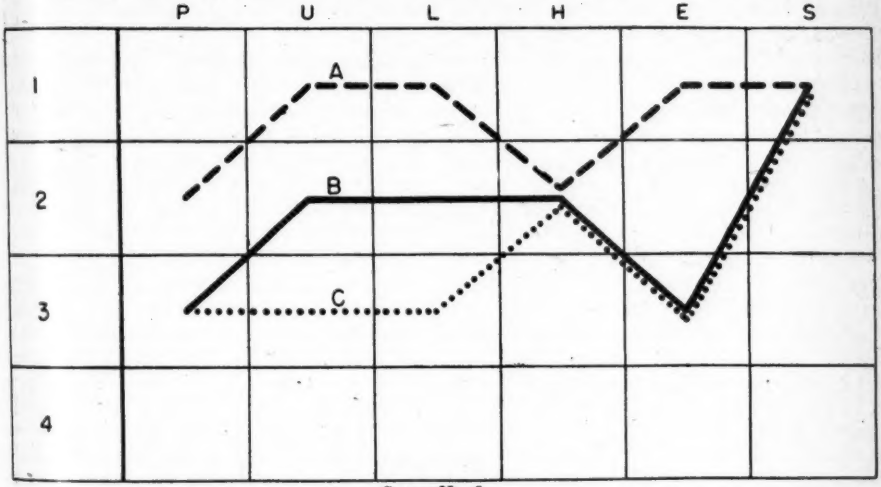


CHART No. 2.

The physical profile plan is susceptible to adjustment and refinement to meet sudden military demands which require special groupings of men who meet specified degrees of physical capacities. Within such groups, selected for ability to carry on under war conditions, the classification system continues to insure the collection and recording of information about each individual. Each of these factors helps the commander in his task of utilizing effectively the manpower assigned to him. Assured of the ability of men to perform sustained effort over long periods, and supplemented by information concerning aptitudes, education, and civilian and military experience, the commander is enabled to meet his responsibility. Brawn and brain are thus harnessed for effective teamwork.

Airfields and Air Transport in Northern Burma

BRIGADIER GENERAL STUART C. GODFREY
Air Engineer, India Burma Theater

THE operations in Northern Burma have presented many novel aspects. The campaign initiated by Wingate, with his long-range penetration groups, supported by Cochran's Air Commandos, introduced a new type of warfare. The capture of Myitkyina airfield, behind enemy lines, paved the way for the collapse of Japanese resistance in this section. Problems of supply have been met by extraordinary solutions.

The following narrative concerns airfield construction in Northern Burma and the use of air transport in supplying the Northern Combat Area Command. The story of the Ledo Road and the tremendous effort expended on it is a familiar one. However, it is not generally recognized, I believe, to what extent operations in Northern Burma have had to rely on air transport as their main means of supply—indeed, for long periods it was their only means of supply.

First, a brief description of the airfields from which Cochran's Air Commandos operated last spring [1944]. To carry out Wingate's concept of a mobile force operating swiftly and effectively behind the Jap lines, it was necessary to provide landing strips quickly, in order to fly in his considerable number of troops, supply them with food and ammunition, and evacuate their wounded.

In 1942 we had organized at home a new type of aviation engineer unit—airborne battalions equipped with small bulldozers and other light equipment designed to be transported in a C-47 or even in a glider. The personnel on these units were trained in loading this equipment, and in using it for the repair or rapid construction of airfields where the earthmoving task was not too formidable. These airborne units had proved their worth in New Guinea; but the first opportunity for a glider-borne mission was afforded by Cochran's audacious undertaking in Burma.

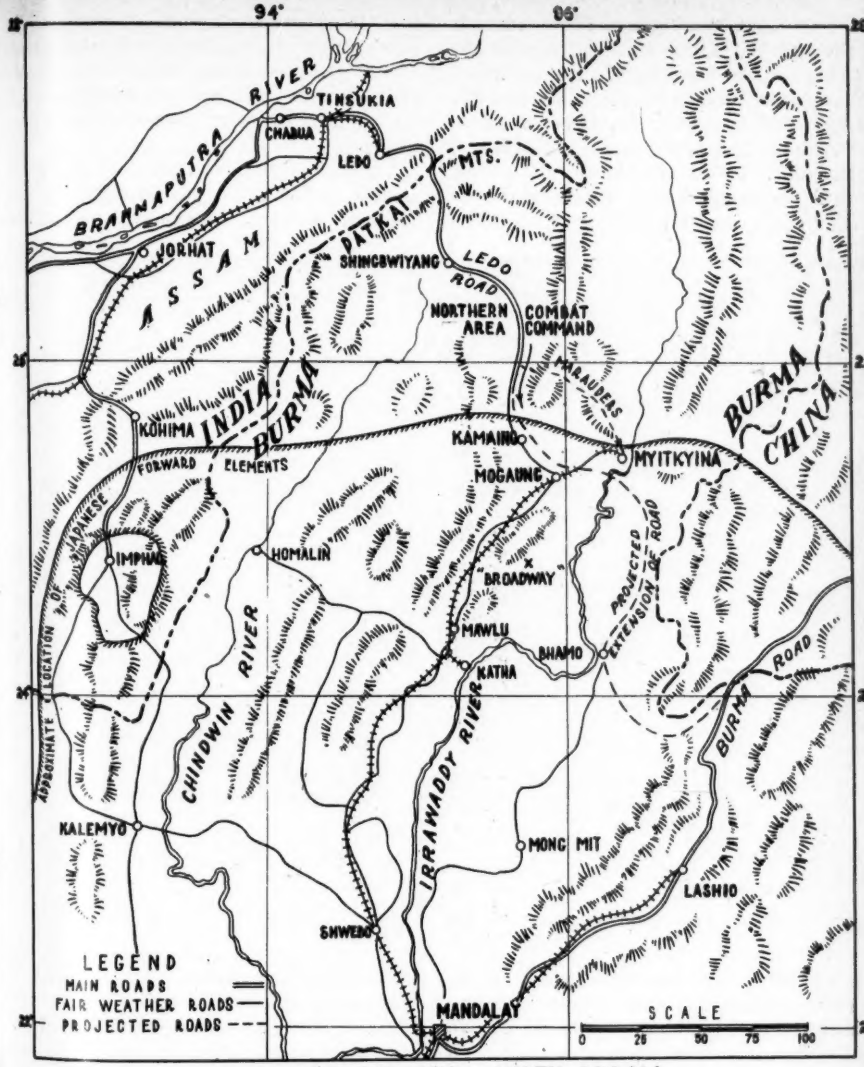
The story of the Air Commandos in Burma is now well known—how, on a night in March 1944, they flew over high mountains and landed in gliders at "Broadway" (see map). This site, deep behind enemy lines, had been reconnoitered only from the air. It appeared to be a smooth, grassed clearing, but the ruts that were not visible to the eye from the air played havoc with the landing gear of the gliders.

The airborne engineers that accompanied this pioneer force unloaded their equipment and went to work—dragging crashed gliders out of the way, laying out a landing strip for the transports that were to follow soon. By the next evening a lighted field was ready to receive, without mishap, the landing of several scores of Cochran's planes loaded with Wingate's men.

Four other similar missions were carried out by detachments from this airborne company, each one presenting combat hazards as well as construction difficulties. At one time, American planes were still using a field while the Japs were in possession of one end of the runway. The airborne engineers took part at times in the defense of these fields, and received from Cochran and Wingate appreciation for their "superb" work.

These airfields were comparatively simple jobs for fair-weather use only. I inspected one field to estimate the effort required to make it capable of operation during the monsoons, and concluded that, in general, these sites were not advantageous for development into year-round all-weather airfields. Although the grading work in most cases was quite light, on one old terraced rice-paddy a five-foot difference in elevation had to be overcome.

These fair-weather airfields played a transient role, and Wingate's columns gradually worked away from them on foot and eventually joined forces with the Northern Combat Area Command. Of far more enduring significance was the extensive airfield construction program around Myitkyina. In May 1944, the Northern Combat Area Command, initially composed of Chinese troops



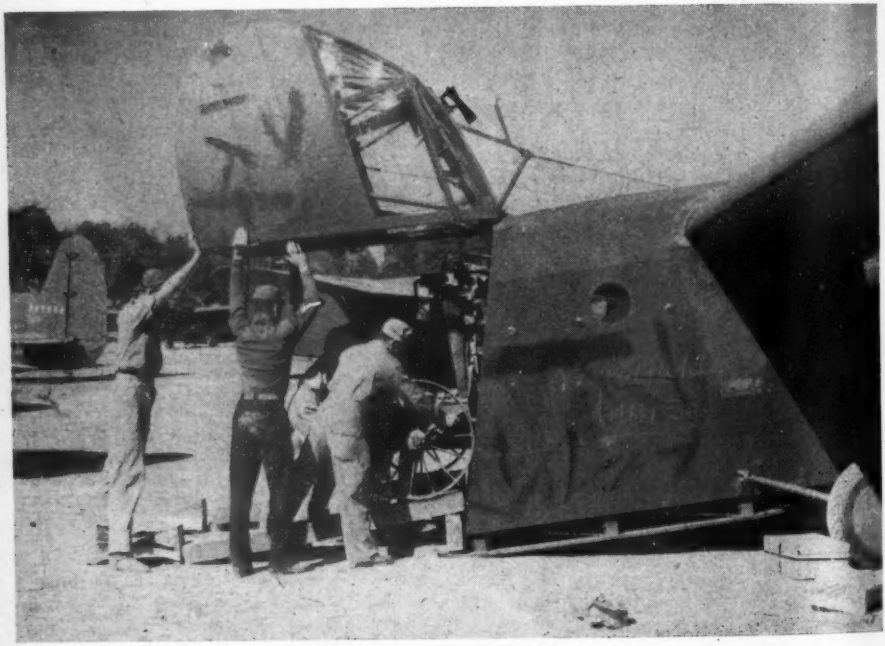
SITUATION MAP - NORTH BURMA
AS OF 17 MAY, 1944

under General Stilwell's leadership, had penetrated Northern Burma to the vicinity of Kamaing (see map). Over the rugged Patkai Mountain ranges, across the Hukawng Valley they had toiled overcoming jungle and Japs, and were still advancing slowly through the narrow Mogaung River Valley. Behind them, hewn out by herculean effort, stretched

the Ledo Road. The fighters and transports of the 10th Air Force, cooperating with the advance of the ground forces, operated initially from bases in northeast Assam. But as the road advanced, the need for more advanced landing fields was recognized, and several fields took shape alongside the road. With the approach of the monsoons and poor flying weather, and the hazards of maintaining the road and bridges during heavy rains, it became imperative that some fighter aircraft be based south of the Patkai Mountains, and that cargo aircraft be provided with landing fields to keep open a "life line." These airfields were built by Brigadier General Pick, SOS, builder of the road.

The capture of Myitkyina airfield on 17 May 1944, by a detached column of Merrill's "Marauders," was obviously of great significance. It placed an Allied force on the Japanese line of communications. It promised the development of more direct and less hazardous air routes to China. But the exploitation of this success, and the continued operations of this isolated force, depended entirely on air supply.

Airborne engineers arrived at Myitkyina airfield on the day of its capture, the first component being transported in eleven gliders. Reinforcements arrived that night in transports, and helped with hand grenades to clear the field of the last pockets of Jap resistance. The existing seventy-five-foot-wide landing strip, it was found, was able to receive C-47's. However, this runway was so badly deteriorated, riddled with craters and soft spots, that its use for the first day or two resulted in many accidents. To repair, improve, and maintain this field was therefore a challenging job for these engineers.



THIS GLIDER WITH ITS ENGINEER EQUIPMENT WAS ONE OF ELEVEN THAT WERE FLOWN TO MYITKYINA AIRFIELD ON THE DAY OF ITS CAPTURE.

Nor was it any fair-weather task, for the heavy monsoon rains were already commencing. To these difficulties were added those caused by the stubborn ten weeks' resistance of the Japs in Myitkyina town, only 2,000 yards from the airfield—which locality was therefore subject to artillery fire as well as attack from the air.

For a while Colonel M. J. Asensio, CE, Engineer of the 10th Air Force, had only one airborne battalion with its light organic equipment. He used this effectively, paying much attention to drainage. Fortunately the battalion had an "ace in the hole" in the shape of a complete set of heavy equipment back in Assam. Moreover, this airborne unit was experienced in operating heavy, as well as light, equipment. Here was another job for the Troop Carrier and Combat Cargo units of the 10th Air Force, which provided the sole transportation of food and ammunition to this detachment of the ground forces. Just as soon as the combat situation permitted, therefore, this heavy equipment began to arrive by air. It was not long before the battalion at Myitkyina had opened up a gravel pit and was working it with a ½-yard gasoline shovel and trucks. Big bulldozers of the D-7 type appeared on the airfield alongside the smaller ones, while motorized graders kept the well-graveled runway in shape.

More help was needed. In recognition of the growing importance of forward airdromes, an additional battalion was assigned to this area. This battalion, a colored unit, was a standard aviation engineer battalion, and came from its task of building one of the super-bomber fields in India. These engineers, too, had to move to their new location by air. For months, traffic over the Ledo Road, beset with monsoon difficulties, had been intermittent, and in any event the point to be reached was far in advance of the completed portion of the road—hence, another airborne job for Major General Howard Davidson's 10th Air Force.

Soon the colored personnel of this battalion were on the site of an additional field, reconnoitering for the location of this field after the fall of Myitkyina itself but before the last pockets of Jap resistance in the vicinity had been cleaned up. Steadily their equipment arrived in daily increments—D-7 bulldozers, graders, dump trucks, and even 8-yard scrapers with their enormous pans. For air shipment all this equipment, of course, had to be disassembled, frequently by use of a cutting torch, and painstakingly rebuilt after delivery. The big scraper in particular requires no less than seventeen separate cuts, with subsequent reweldings.

ONLY THESE AIRBORNE BULLDOZERS AND OTHER LIGHT EQUIPMENT WERE AVAILABLE INITIALLY AT MYITKYINA AIRFIELD—AND THEY DID THEIR WORK WELL.

The airfields built and now building in North Burma are typical field airdromes, built of gravel the availability of which was a major consideration in the siting of the fields. Some asphalt surfacing has proved desirable and is now being provided. The first Myitkyina field was substantially completed during the monsoons, despite the handicap of heavy and frequent rains. The record fall of five and a half inches in six hours occurred at night and raised havoc with the camp, but not with the well-drained runway, which received seventy transports next day. With the advent of the dry weather in October, progress was greatly accelerated, and several other fields were shortly placed in operation.

Drainage has always received primary consideration. The time to select all-weather airfield sites is *during* the rains. Hardly less imperative is availability of material, for the limitations on the amount of equipment make it mandatory that the proper soil ingredients be close by. For the same reason, heavy earthwork had to be avoided. Therefore the early initiation of a complete engineering site survey to determine soil conditions, grades, amounts of cut and fill was a must for

TAILORED TO FIT HANDILY INTO A C-47 PLANE, THE AIRBORNE EQUIPMENT CAN BE READILY LOADED AND UNLOADED.

Asensio and his engineers. There is a tendency to call these engineering features "refinements," but with limited resources they are more important than ever.

In the layout of these fields the trend is away from dispersed patterns toward more compact designs, with large parking aprons. In other words, our air superiority justifies taking a somewhat greater risk for the sake of less construction and more efficient operation. The engineers provide the essentials—runway, taxiway, apron or hardstands, control tower, water supply, gasoline and bomb storage, access roads; the troops erect their own tents and auxiliary buildings.

For security reasons, not until quite recently have the notable pipeline projects for the Far East received any publicity. It has now been announced that the "longest pipeline in the world" will eventually fuel China. Meanwhile, completed portions of the lines in India and Burma have already served a most useful purpose in supplying forward airfields and other installations with gasoline, and greatly reduced the load on other means of transportation. Materials for the pipeline in Burma were transported by train, plane, truck, and raft. This pipeline climbed over mountains 5,000 feet high, and despite floods and monsoon rains, its completion was accomplished expeditiously by engineer petroleum distribution companies assigned to the SOS.

Before November's end, the 20,000th transport plane had landed and taken off from a single Myitkyina airfield, each bringing in its three-ton load of troops, supplies, or equipment. Never a day when the field was completely closed, while at peak 222 transports landed and took off in one twelve-hour period. Fighter activity at times had been almost as pronounced in affording fighter-bomber cooperation with the ground forces. Nor had the forward movement of aviation engineer troops ceased, as more units were needed for the construction of additional airfields to support the advance of the ground forces, and to serve the Air Transport Command. Upwards of 1,500 plane loads alone were devoted to the movement of engineer troops and their heavy equipment, including, for example, more than two score of D-7 bulldozers. And all this time, until the first convoy came through by road in mid-November, the supply of Myitkyina was almost entirely an Air Force responsibility—magnificently performed. The total deliveries, including what was dropped to forward elements, reached an impressive total of something like 100,000 tons.

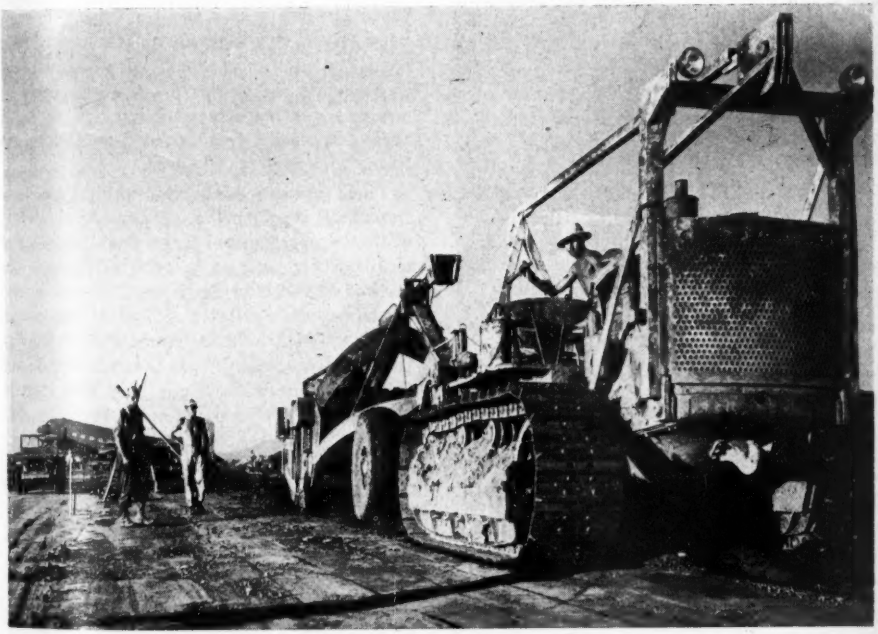
Since the advent of the dry season in October, the airfield construction program in Northern Burma has made rapid progress. In the Myitkyina area several fine all-weather fields are now in operation. This area has indeed now become a rear area as the war has moved south beyond Bhamo and Katha and converged with the British Fourteenth Army advance from the west.

Bhamo at one time threatened to become another Myitkyina, as the Japs dug in and

held out there for some time after being practically surrounded. During this period, since the existing airfield at Bhamo was under artillery fire, temporary use was made of a site at Momauk nine miles to the east. A few aviation engineers, transported by liaison plane, joined Chinese engineers to prepare the first landing strip barely capable of taking C-47 planes. This permitted flying in an engineer company of a standard aviation battalion with its heavy equipment to improve the field. This company moved overland to Bhamo as soon as the existing site there was accessible. Their first task was to fill and compact the twenty-nine ditches which the Japs had dug across the field, and the strip was soon placed in operation as a fair-weather airfield. Work then commenced on a more adequate all-weather, graveled field adjacent thereto.

Meanwhile, in the railroad corridor to the west, a fair-weather field had been prepared at Mawlu. Troops and equipment for this job were brought down over the railroad from Myitkyina. This field has since been abandoned with the provision of more advanced fields.

Another forward airfield deserves mention. During December a sudden need developed for an airfield some distance south of Bhamo, close to the front in an area occupied by Chinese troops. A small detachment of engineers went in by air and, assisted by Chinese engineers, rapidly constructed with light equipment a fair-weather transport strip. While this field was being built, a U.S. infantry battalion advanced into this area. This battalion was in advance-guard formation, with guns at the "ready" for the Japs they expected to meet at any time. Great was their



ONE OF MANY TRACTOR-DRAWN 8-YARD SCRAPERS WHICH WERE DISASSEMBLED AND TRANSPORTED TO MYITKYINA AIRFIELD BY AIR—A UNIQUE ACHIEVEMENT.

surprise to find an airfield under construction by a detachment of aviation engineers.

From these forward airfields, the ground forces of the Northern Combat Area Command operating in this area, consisting of Chinese, British, and U.S. troops, still receive the bulk of their supplies. With the advent of the dry season, the Ledo Road and the existing network of fair-weather roads once more

EXTENSIVE CUTTING OF HEAVY EQUIPMENT WAS REQUIRED FOR ITS AIR MOVEMENTS, WITH SUBSEQUENT REWELDING.

became valuable supply lines, over which guns and heavy items of equipment could be brought up. The main reliance of these forward units, however, continues to be on air supply. Even if the roads were perfect, the motor equipment and gasoline required to cover all the ground simply do not exist in this theater.

In all airdrome construction around Myitkyina and south thereof, aviation engineers worked directly under Air Force control. Such indeed is their *normal* employment, as contemplated by the War Department when the aviation engineers were organized as a component of the Army Air Forces. Aviation engineers are considered an essential part of the air combat team, and these particular engineers under Colonel Asensio have been commended by Major General George Stratemeyer (whose Eastern Air Command directs all U.S. AAF and RAF combat operations in Burma) for their effective work at Myitkyina.

It is noteworthy that the aviation engineer troops of the 10th Air Force comprised initially one airborne battalion, followed up by several standard battalions. In practice, there is now in this theater little difference between the two types of units, since the airborne battalion now works with heavy equipment, while the standard battalions have become so used to disassembling and flying in their equipment that they can well claim the term "airborne" themselves.

These operations around Myitkyina have impressed me with the efficacy and flexibility of air transportation. In general, we think of transport by air as a relatively expensive method. At Myitkyina, it was the sole means of transport available. What is more outstanding, it has been demonstrated that in traversing rugged, jungle-covered terrain, air transport has advantages over the road in many ways. Under such conditions one C-47 plane can do the work of perhaps fifteen 2½-ton trucks. While the plane is more expensive initially than the equivalent number of trucks, it lasts many times longer. The manpower required to operate and maintain the planes is much less than for a comparable fleet of trucks. The effort required to build and maintain the airfields is only a fraction of that required to carve out and maintain a virgin road through such country. Certainly, supply by plane is more flexible and speedy, and (in this theater at least) has proved less subject to interruption by weather.

The operations around Myitkyina, conducted by the 10th Air Force, are not the only ones in this theater where the value of air transport has been strikingly demonstrated. The British Fourteenth Army, in its operations around Imphal and in the Arakan, and more recently in its advance into central Burma, has had abundant demonstration of its efficacy—at times a life-

saving ability to reach isolated detachments by dropping. And beyond the matter of food and ammunition supply, the story (when it can be told) of whole divisions moved by air, pack-mules and all, will make interesting reading.

This mission of supply to the British, which was brilliantly initiated in the early days by Brigadier General William D. Old and his Troop Carrier Command, is being continued now by the Combat Cargo Task Force, under Brigadier General Frederick W. Evans. These transports operate largely from British-built airfields. I attempt here no comprehensive record and evaluation—such must come later when all the reports are in. I omit any consideration of the Hump lift to China, itself a gigantic task of air supply. But I cite the Myitkyina operations as having come under my personal observation, and as a case where aviation engineers worked effectively under Air Force control to provide quickly the airfields which made the air cooperation and air supply possible.

Even in a theater of operations where good roads exist and are used to the limit, air transport is being increasingly used to help meet the arduous supply and evacuation problems of modern war. Such use of aircraft at the front used to be considered an emergency, but reports from France indicate that during the second phase of the invasion, with its rapid advance, air transport assumed tremendous importance in supplementing the railroads, pipelines, and roads, which could not keep up with the fast-moving armies. *All* methods of transport in war are of course needed, each for such utilization as circumstances dictate. But I venture to say that this operation in Burma, where considerable forces were adequately supported for nearly six months *entirely by air*, will be studied and pondered as a classic for its lessons in future campaigns.

A Specialized Patrol System

A division in the European theater was reported to have adopted a patrol system which was highly successful and very much praised within the division and was copied by several others.

A patrol unit was organized and performed all the patrolling of the entire division. This unit was composed of three officers and sixty-six enlisted men, all volunteers. The unit was divided into three groups of one officer and twenty-two enlisted men each. Every third night, one group performed patrol duty, and the other two groups remained at rest. The unit was well quartered, it ate the best of food, and it enjoyed special privileges.

When a man was tired of this assignment, he was replaced by other volunteers. In spite of the hazard and other disadvantages involved, there were sufficient volunteers. The two-day interval between patrols was one of the important reasons underlying this fact. Another advantage of this system was that members of the patrol became well acquainted with one another. New men could be easily indoctrinated. The patrol unit devised signals and calls. The groups obtained information from each other concerning the terrain, enemy methods, special hazards, and other similar items.

Because of the expertness acquired under this system, one officer reported proudly that other divisions relied upon his for enemy information.

It is difficult at times to make decisions, but no decision is needed in regard to preventive maintenance. It is decidedly necessary for all equipment.

—Maintenance Division, ASF

The Tank Battalion

MAJOR WILL H. KELLEY, *Cavalry*
Instructor, Command and General Staff School

HOW can I best use my tanks? This is a question often asked, and is in the minds of many commanders when their unit has a tank battalion attached. In answer, the following article is written with the thought that it may serve as a review of the organization and uses of the standard tank battalion, and to emphasize the importance and value of this unit in cooperation with other arms.

Before considering the ways in which the tank battalion works, let us first take a look at the tools with which it has to work. The organization is shown in Figure 1. The personnel, principal vehicles, and armament are as follows:

Aggregate personnel	724
Medium tanks (M-4 equipped with a 75-mm or 76-mm gun, two .30-caliber machine guns, and one .50-caliber machine gun)	54
Light tanks (M-24 equipped with a 75-mm gun, two .30-caliber machine guns, and one .50-caliber machine gun)	17
Assault guns (M-4 medium tank equipped with a 105-mm howitzer)	6
Mortars, 81-mm (three mounted on half-track vehicles)	9
Trucks, 2½-ton	39
Trucks, ¼-ton	26
Tank recovery vehicles	6

EMPLOYMENT OF THE BATTALION

Regardless of the type of operation engaged in—offensive or defensive—the function of the tank battalion is always that of the offense, and the missions of the battalion should be assigned with that point in mind. This offensive nature of the battalion is derived from the principal characteristics of armored units—a high degree of battlefield mobility, a tremendous amount of armor-protected fire power, and great shock action. These characteristics are reflected in all recent reports from the various active theaters where tanks are employed: i.e., tanks are greatly feared by our enemies both from a tactical standpoint and more so from the morale standpoint.

The primary and basic doctrine of tank employment is that of *mass*. This doctrine has been emphasized and re-emphasized by "tankers" since the beginning of tank warfare, and where followed, tank units have been successful if they have had anything like a fair break; but on the other hand we find unsuccessful results where the unit has been split up and used piecemeal in situations where the battalion can be employed as a complete unit. However, many situations will arise where the employment of the entire battalion is not possible, and it is then that smaller units of tanks such as the company, the platoon, or even a section (two tanks) may be employed with success. The type of terrain generally dictates the size tank unit to be employed.

The role of the tank battalion may be divided into a primary and a secondary role, the former being further divided into assault and direct support, and the latter being that of reinforcing artillery fire. In the primary role, particularly that of assault, it is essential to success that the battalion be reinforced by infantry for the principal purpose of protecting the tanks against the ever-present antitank gun, antitank grenadiers, and bazooka men, and for holding an objective that the tanks have seized until larger forces of dismounted troops can move forward to consolidate the objective. It is obvious that such large and prominent vehicles as tanks cannot hold an objective for any great length of time against a determined enemy counterattack; whereas, dug-in foot troops can hold with the support of the tanks and artillery. The assault mission should be given to the tank battalion when the terrain is suitable for tanks, where there are few natural and artificial obstacles, and, above all, where the enemy is weak in antitank guns.

In the primary role of direct support, the tank battalion with its tremendous amount of fire power can give dismounted units a real "backing," and with cannon and machine-gun fire can knock out the enemy's automatic

weapons which are the principal casualty producers of these troops. Conditions that dictate the use of tanks for direct support must be such that undue tank casualties will result if used otherwise: normally, a strong enemy antitank-gun defense, terrain unsuitable for tanks, and natural and artificial obstacles.

The secondary mission of tanks—artillery reinforcement—is becoming more important and will continue to increase in importance as more commanders realize the added advantage of having their artillery reinforced with the seventy-seven cannon of the tank battalion.

Normally, this mission will be assigned to the battalion in relatively static situations where it is not contemplated that tanks are to be assigned one of their primary roles. If the tanks are functioning as artillery, they must be supplied with ammunition other than their prescribed load, in order that a full load of ammunition is aboard if the tanks must be used in their primary role.

The increased importance of the tank's secondary mission is shown by the stress on indirect firing in training, and by the fact that within each medium tank company there has been included the equipment prescribed for the fire direction center in the light field artillery battalion.

The tank platoon (five tanks) is the basic fire unit for indirect fire, and the company headquarters is the control unit. Tanks are usually attached to the artillery unit which controls the fire of the tanks through utilization of the artillery fire control and communications system.

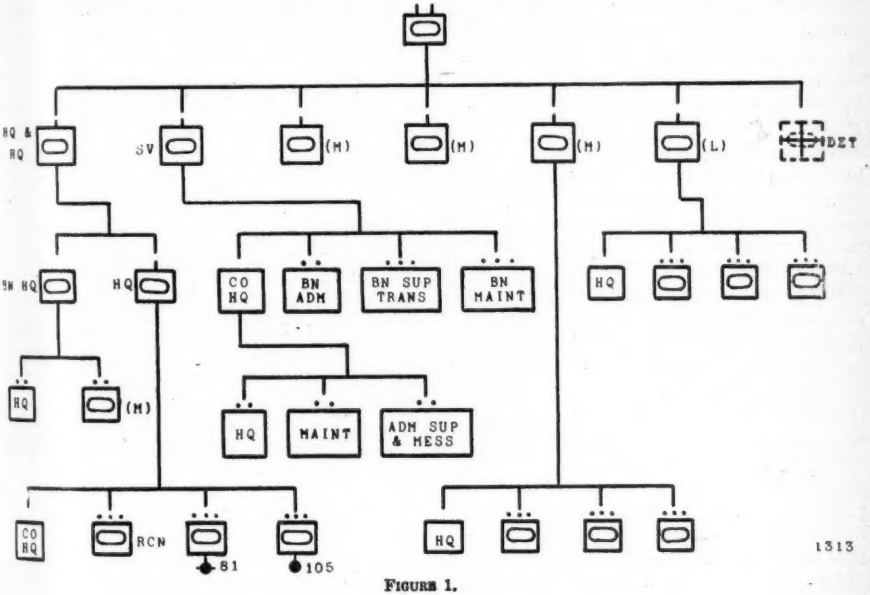


FIGURE 1.
STANDARD TANK BATTALION.

The formation in which the tank battalion enters combat is dependent on many factors and considerations of which the principal ones are: terrain over which the battalion is to operate, its mission, the enemy situation, the amount of supporting fires, and whether or not the battalion is to operate alone or as a part of a larger force. The depth and width of the formation also are determined by these factors, and may vary in width or frontage from 400 to 3,500 yards, and in depth from 900 to 4,500 yards. A wide frontage may be

taken on a covering mission, in open terrain, and when the enemy has few antitank guns and his other antitank defenses are light; whereas a narrow frontage, which gives greater depth and sustained driving power, may be used in a penetration, in wooded or other difficult terrain where maximum control is required, and where the enemy is strong in antitank defenses and cannot be avoided.

In the attack, the battalion may be in one of several formations, and within the battalion the companies and platoons may also be in any combination of these formations—the principal changes being made to meet the immediate situation determined by the nature of the terrain and enemy opposition encountered.

The formations most commonly used by the tank battalion are: inverted wedge, wedge, column, echelon, and line; however, other formations or modifications of the above may be used to meet a particular tactical situation. Regardless of the formation used, tank units will and must follow the principle of fire and maneuver if success is to be achieved. Of course, this principle is used by all ground units, but is especially important and vital to armored operations due to the vulnerability of tanks to antitank guns, which are in most cases exceptionally well concealed and are difficult to locate from within a moving tank. Even in the tank section (two tanks) this principle applies. As applied to the battalion, we normally find that the reserve company, the mortar platoon, and the assault-gun platoon will provide the base of fire; however, it is desirable to have additional reinforcements such as artillery and infantry.

Prior to the employment of the tank battalion in an attack, consideration must be given to positions on the terrain which will be occupied during the action—the assembly position, attack position, objective, rallying point, and alternate rallying point. The assembly position is, as the name implies, the area or position where the battalion assembles and makes ready for the attack—such as a final check of vehicles and weapons, and the issuance of final instructions. This area is preferably beyond the range of hostile medium artillery fire, usually about 8,000 to 9,000 yards from the line of departure and in a concealed position. The attack position is as near the line of departure as practicable, considering concealment. Here is made the last minute coordination with other troops, especially infantry. Control is regained, and a fully deployed formation assumed—the one in which the line of departure is to be passed. The objective is normally a well defined terrain feature in the enemy's rear area. The rally point is also a well defined terrain feature at which the tanks assemble after reaching their objective, and is usually in rear of (on the friendly side of) the objective. Here the tank unit reorganizes, refuels, performs necessary maintenance, evacuates the wounded, and prepares for further action. When the tank battalion is given the mission of capturing an objective located beyond the range of its supporting artillery, one or more intermediate objectives are designated to in-

FIGURE 2.
A TANK PLATOON FIRING AS ARTILLERY.
(Copyright *Time, Inc.*)

sure that artillery support will be maintained until the final objective is seized. After the capture and consolidation of an intermediate objective, the artillery will displace forward to positions from which support can be rendered for the attack on the next intermediate or final objective.

Artillery fire is adjusted by a forward observer (mounted in a tank) from the artillery unit, usually following the leading tanks. This officer has direct radio communication with the supporting artillery battalion and the tank battalion commander. The tank for the forward observer is furnished by the artillery in the armored division, but in the separate tank battalion a tank is furnished the forward observer by that unit—there being one extra tank in the battalion headquarters for that specific purpose.

In the defense, the primary mission of the tank battalion is to counterattack in conjunction with other troops. The counterattack may be launched to eject an enemy who has succeeded in penetrating the position or to destroy the enemy while he is forming for an attack. In infrequent cases, tanks may be used in hull-down or dug-in positions to assist the infantry in holding a position. Such use, however, fails to take advantage of the mobility and shock action inherent in the tank.

Control and Communication

Control of the tank battalion and of its component units is one of the most essential as well as one of the most difficult operations in its employment, and without proper control the tank attack will be futile. Consider that each tank is a separate and individual unit and in battle is, strictly speaking, "on its own." To coordinate the efforts of these units is difficult, and must be accomplished through detailed training beginning with the basic training of the unit. Commanders, from the battalion commander down to the tank commanders, must be indoctrinated with the will to be under control at all times.

The means for control may be divided into radio control, hand and flag signals, pyrotechnics, and control through orders either oral or written. The last-mentioned means is the most important, particularly in the initial phases of an operation. Orders must be clear and concise, and include the mission, the objective, known enemy information, the rallying point, and the plan of attack; and to be effective these instructions must be passed down to the individual crewmen in each tank.

Radio is the principal and basic means of communication within the battalion, and reliance upon this means is great, as evidenced by the fact that there is a total of 112 SCR sets of various types within the battalion—SCR 506, 508, 509, 510, 528, and 538—all combat vehicles being equipped with one type or other and some administrative vehicles similarly equipped.

When working with other troops, control and communication must be emphasized and coordinated if the team is to function properly. When the opportunity exists—and it must be made to exist—intensive joint training must be carried out to gain the maximum benefits from the combination of the arms.

Capabilities and Limitations

Since tanks furnish the striking power of armored as well as other units to which attached, it is necessary to understand and keep constantly in mind their capabilities and limitations in the assignment of missions.

The tank battalion should be assigned missions which its characteristics are designed to accomplish and, except in emergencies, should not be assigned missions that other available troops can perform satisfactorily.

The capabilities of the tank are numerous, but among the more important are: its ability to move across country at comparatively high speeds; its ability to cross small obstacles, ditches, and shallow streams; its ability to pass through thick woods and brush; its great fire power; its crushing ability to overrun personnel, matériel, and equipment; and its armor protection for the crew. The tank battalion as a unit is capable of sustained action and deep penetrations into hostile territory (when reinforced with infantry, artillery, and engineers); of attacking at a time and in a direction unexpected by the enemy, and oftentimes over seemingly impassable

terrain. Due to its mobility, the battalion is capable of the rapid concentration of armor-protected fire power either for assault or direct-support purposes, or to reinforce the fires of artillery units.

The tank has many limitations, among which are these: it cannot cross deep or soft-bottomed streams, marshy ground, or swamps; it cannot cross wide ditches or other large obstacles; it cannot pass through dense woods; it cannot cross bridges and culverts of light constructions; its operations in mountainous country are generally limited to roads; its observation and control are difficult when the vehicle is operated with all hatches closed; and it is vulnerable to the fire of artillery and antitank weapons and to bombing attacks.

The battalion, in addition to the above, may be limited by the difficulty of fuel and ammunition supply and by the necessity for periodic maintenance of vehicles.

Of all the many factors involved in the employment of tanks, terrain is probably the most important and certainly the most often thought of. The "tanker" is always conscious of, and is constantly in search of, information of the terrain over which he expects to operate.

Conclusion

Many thoughts will come to mind when one considers the standard tank battalion in the light of its varied uses and the proper technique of its employment, but foremost, keep the thought in mind that this battalion is one of the most heavily armed and armored units in our Army today; it is a weapon of the offense and as such will furnish the "Sunday punch" for any unit with which it is employed.

Innovations in Bombing Technique

Extract from an article by Marshal of the RAF Sir E. Ellington in *The Army Quarterly* (Great Britain) January 1945.

There have been some changes in the use and method of the British heavy bombers. The partial elimination of the Luftwaffe and the safer approach to targets in consequence of the conquest of the occupied countries have made possible the use of the Lancaster and Halifax with fighter escort by day. There has also been a welcome reduction in the rate of loss. This has fallen to one-fifth of that of October 1943, and one-sixth of that of October 1942, while the weight of bombs dropped has risen by three and a half times that of 1943 and sixteen and a half times that of 1942. Further, after two years when dark nights have been preferred, full-moon periods are now chosen.

Innovations in bombing technique have been disclosed. Support groups of fighters to assist night bombers in a manner analogous to the fighter escorts of day bombers are now being used. By destroying large numbers of German fighters in the air and by attacking the airfields from which they work, they divert the enemy from the stream of bombers on the way to and from the targets. A second innovation is the use of a master bomber, who controls the action of the main force and ensures that the markers placed by the pathfinders are marking the targets, or places others elsewhere correctly. There have been many occasions when he has stopped the attack and relaid the markers to make quite certain that the target was properly marked. A master bomber was first used to control the bombing of the Möhne Dam in August 1943.

The general who is capable of great things is he who possesses the finest civil qualities—insight, calculation, decision, eloquence, knowledge of men.

—Napoleon

MILITARY NOTES AROUND THE WORLD

GERMANY

The German Royal Tiger Tank:

Early in December 1944 the French in Alsace reported that they had destroyed a number of a new and improved German tank. This was the Royal Tiger, successor to the formidable Tiger already known to our armies on the Continent.

The original Tiger weighs well over sixty tons. It has a maximum speed of about thirty miles an hour and is thought to be very reliable mechanically. On its front the weight of armor is considerable, but the turret is hand-operated, so that the tank cannot hit out with the freedom or speed demanded in modern battles. In the Royal Tiger, most of the defects have been overcome. It mounts an improved version of the 88-mm gun, and sometimes a 105-mm of terrific hitting power. In place of the hand-operated turret of the ordinary Tiger, the new version is fitted with a power-operated turret. The frontal armor, too, has been increased and is now thought to have a thickness of twelve inches. All in all, it is a heavier, better armored, and better armed vehicle.

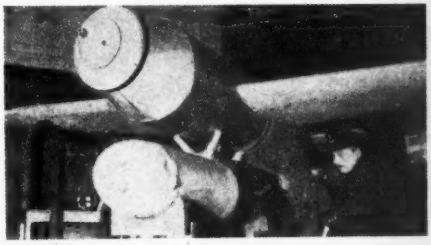
The tracks are enormously wide. These prevent it from sinking into the ground when traversing difficult country or only partially made-up roads. Another point of considerable interest is its low build, which makes it a difficult silhouette for attacking tanks or artillery.

So far as is known, the number of Royal Tigers in use at the present moment is still comparatively small. But there is no doubt as to the new tank's general supremacy on the field of battle.

(*The Sphere*, Great Britain)

Anti-Shipping Glider Bomb:

Found ready-packed for transportation near Paris, this Henschel Hs 293 anti-shipping glider bomb was unpacked and put on



display. The Henschel Hs 293 bears a striking resemblance to the notorious FZG 76 flying bomb. One of these glider bombs can be carried under each wing of the Heinkel He 177, the Dornier Do 217 k-1, or the Junkers Ju 290. The Hs 293 is controlled by radio from the parent airplane. Dimensions: span, nine feet six inches; length, ten feet eight inches.

(*The Aeroplane*, Great Britain)

New Flak:

Incendiary flak pellets are being used by the Germans to start fires inside our airplanes. They are shot into the air in shells similar to those of ordinary flak. When the shells explode, the incendiary pellets are sprayed.

Pellets which failed to ignite have been recovered from our planes. The cap is painted yellow. Ignition apparently is caused by a direct blow on the pellet cap which drives a

firing pin into a primer. This, in turn, fires an incendiary powder. The pellets are a little over an inch long.

(*Air Force*)

Heinkel He 280 Reaction-Propelled Fighter:

Of the reaction-propelled aircraft types possessed by the Germans, only the Messerschmitt Me 262 and the Me 163 are in production in any quantity. Others, including the Heinkel He 280, and Arado and Junkers designs, are still more or less experimental, although the first type has been reported on operational service.

Although probably built to a similar specification as the Me 262, the He 280 differs in having twin fins and rudders at the ex-

tremities of a dihedralled tailplane, and different power units, probably the BMW 003. Heinkel heredity is displayed in the curved wing shape and the cockpit fairs into the rear fuselage. Pilot-ejection apparatus is usually fitted.

Housed in the long nose are four 30-mm Mk 108 low-velocity cannon for bomber-destroying, but although the maximum speed approaches 500 miles per hour, the He 280 should prove comparatively easy to destroy by our latest fighter aircraft.

A small retractable nose-wheel undercarriage, in which the main wheels retract inwards into the wings and the nose wheel backward into the nose, gives the He 280 a low ground clearance. The jet units are set on the wings in such a manner as to assist take-off considerably by the reaction of the "jet" on the aerodrome surface.

Dimensions.—Span, about forty feet; length, about thirty-six feet.

Points of recognition.—Two-motor, low-wing monoplane, with twin fins and rudders at the extremities of a rectangular dihedralled tailplane. Extremely long nose with cockpit step-up. Small underslung jet units protruding equally from leading and trailing edges. Curved tapered wings to pointed tips.

(*The Aeroplane*, Great Britain)

U.S.S.R.

Cultural Activities in the Red Army:

Cultural and educational activities have always constituted a major part of the training of the Armed Forces of the Soviet Union.

Each Red Army regiment and division has its club. Every army front and military area has its "Red Army House." Every battalion, company, and even platoon has a special tent or dugout, or a corner in the barracks, set aside for cultural activities. Here there is always a small lending library, constantly replenished with new books; there are late newspapers; facilities for playing chess, checkers, and dominoes; and musical instruments, usually accordions.

The regimental and divisional clubs naturally have larger libraries. They also have bands and orchestras, and a considerable supply of musical instruments. Art circles, choruses, and sports groups arrange for entertainments. Motion pictures are very popular, and cinema installations mounted on motor trucks make the rounds of the units at the front. In addition to the general Red Army clubs, there are also officers' clubs.

Each company in the field has a man assigned to distribute books. In addition to his regular kit, this Red Army man unselfishly carries the company's lending library.

Portable cinemas following the advancing units often give showings under conditions that might appear absolutely impossible.

This comprehensive and varied cultural and educational activity has undoubtedly contributed greatly toward raising the Army to its present high level.

(*Information Bulletin*,
Washington Embassy of USSR)

BRAZIL

Camp for Brazilian Troops in Italy:

An aerial view of the staging area near Pisa for troops of the Brazilian Expeditionary Forces which are part of the Allied Fifth Army. The Brazilian soldiers, first to represent a South American nation in a European war, are in action at the western end of the line across Italy. Their contingent consists of air, infantry, and artillery units.

(*The Sphere*, Great Britain)

FRANCE

The New French Army:

Up to the present time, the French Army has been maintained at the reduced strength of eight divisions. The just insistence of the Government, the prospects of a longer war than had been anticipated, and the restoration of important harbors such as Antwerp and Le Havre make it possible for us to consider the equipment of a greater number of divisions in our country [France]. The figure of 650,000 men has been mentioned. The induction of the Class of '43 is the first step in this direction.

Up to now, the formations under the colors have been outfitted with foreign equipment, mainly American. Along with the progressive reconstruction of national industry and thanks to an already considerable effort, the equipment of the new army can be largely of French origin—especially as regards the light and heavy infantry armament and the light and medium armament of the artillery. But in spite of the considerable increase in stocks of clothing, the French Army will remain for a long time dependent on Allied textiles and leathers.

The solution of the problem of equipment and supply, which has dominated the entire problem of reconstruction of the French Army, will permit the establishment of army corps and divisions, and of a number of units for the protection of lines of communications.

The FFI units (*Forces Françaises de l'Interieur*) will be amalgamated little by little with the units of the old army.

The training of the cadres, the essential framework of the new army, is the main object of attention of the Minister of War. The Cherchell School—the Saint Cyr of the new army—and regional schools for commissioned and noncommissioned officers are operating at full capacity.

(*Le Monde*, Paris)

French Navy:

The United States Navy has spent more than $200,000,000 to rebuild the French Navy since the Allied landings in North Africa in 1942, according to the Office of War Information.

American Navy Yards have repaired, refitted, and modernized more than a score of French naval vessels. Repairing these ships cost $37,777,782.52. This total does not include the cost of new material that went into these ships or was sent abroad for installation on other French Navy ships.

The United States Navy has transferred 155 naval and auxiliary craft to the French

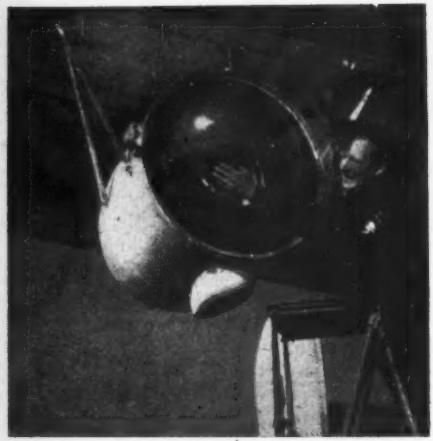
Navy. The vessels transferred include fifty submarine chasers, thirty-four patrol craft, thirty-one minesweepers, twenty-four tugs, six destroyer escorts, four water barges, three net layers, and three gasoline tankers. The combatant ships transferred prior to this year cost the United States $125,960,889.49 and the auxiliary craft $2,471,358.20.

The United States has also transferred four squadrons of planes to French naval aviation, given the French Navy $6,164,298.55 worth of clothing, and during 1945 will train in this country approximately 300 French naval flyers. Some 100 of them are already in training. The United States trained pilots and air and ground crews for the four squadrons of planes that were transferred.

(*Army and Navy Journal*)

GREAT BRITAIN

The Leigh Light:



One of the factors which contributed to the defeat of the U-boat in the Bay of Biscay was the Leigh Light. This is a powerful searchlight fitted to Coastal Command aircraft so that the work of hunting the German submarines could go on by night as well as by day. The picture shows how the Leigh Light is fitted to a Liberator aircraft.

(*The Sphere*, Great Britain)

Proof of the Bombing:

In the past there have been critics of the RAF's system of mass bombing who have said that the effort involved was out of proportion to the results achieved. So long as assessment of bomb damage was largely a matter of conjecture this form of argument could not be finally answered. Now, however, damage experts who have moved into the Rhineland in the wake of the ground forces have found more damage than they expected. Previously they had been able to assess damage only by the interpretation of air photographs and the sifting of Secret Service reports. They now find, on actual inspection, that they had underestimated the real damage anything from ten to fifteen percent. They have therefore been able legitimately to increase their estimates of the damage done to cities still in German hands. Experts, generals and common soldiers alike, are agreed on their verdict, and it is unlikely that there will be much criticism in the future of the effectiveness or cost of mass bombing.

(From a British source)

JAPAN

Land Mines vs Aircraft:

For some time it has been known that the Japanese are employing land mines to combat low-level attacks by Allied aircraft. At a Central Pacific airstrip recently captured, mines were discovered buried on all sides of the strip. They were so connected that an observer, hidden in a dugout, could detonate a string when the strafing plane came over the mined area. Camouflage of both dugouts and mine fields was excellent.

(*Air Force*)

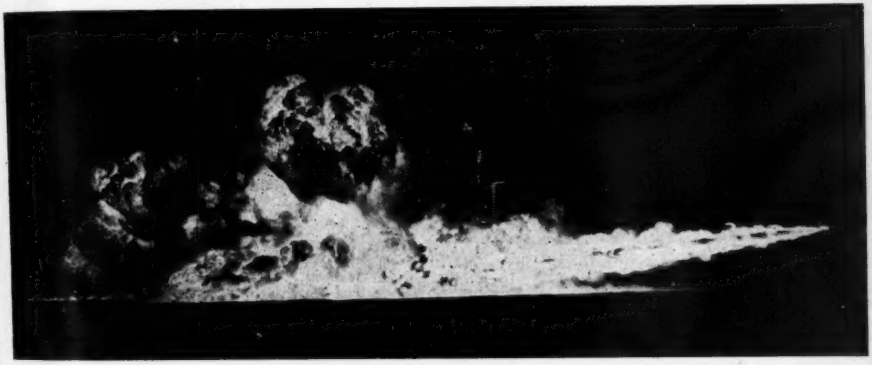
UNITED STATES

Flame-Throwing Tanks:

Flame-throwing tanks, using a unique system of ejecting their deadly fire, were developed by the Army's Chemical Warfare Service last year and have been used with devastating effect against the Japanese in the Central Pacific and the Philippines.

Their success in this tough combat "shake-down" was outstanding.

The tank spews several different kinds of flaming fuel, in thin or heavy mixtures, for great distances, withering anything in its path. The picture below, from a night photograph, shows the terrific "flamepower" of



Standard flame throwers and methods of sending them against an enemy position, on wheels or tracks, were demonstrated on Oahu early in 1944. But the Army kept searching for a better system by which they could be incorporated into well-armed tanks, rather than simply mounted on vehicles. In March [1944] an obsolescent light tank, "Satan the First," was used as the mount for the Army's first new-type flame-throwing tank.

"Satan" was demonstrated before high-ranking Army, Navy, and Marine officers and lived up to its name. Immediately, the Marines requested twenty-four such tanks produced in a month, in order to have them ready for the Marines in the battle of Saipan. By a series of quick but efficient adaptations, the Army turned out the twenty-four flame-thrower mounted tanks in less than a month's time. Then the tanks were readjusted and waterproofed, their crews trained in their operation, and the tanks combat loaded aboard ship for the Marianas task force. the new weapon, using an oil-like substance that continues to burn for a long period when laid upon an enemy pillbox or defense installation.

(Released by G-2, Headquarters USAFPOA, Public Relations Section. U.S. Army Signal Corps photo)

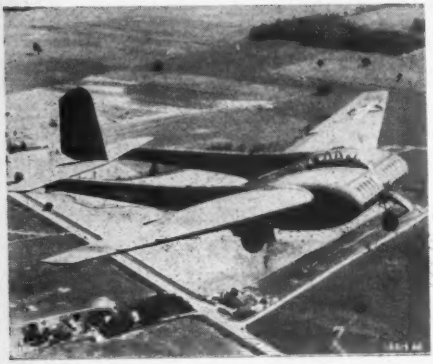
New Tie-Down System:

The latest developments in cargo tie-down methods are included in the construction of the C-97 plane, making obsolete former systems of ropes and nets. One method, for example, employs four large pallets which are pre-loaded on the ground. The cargo is lashed down, and then the entire platform is lifted into the plane and made fast.

The two decks of the plane are achieved by building, in effect, one fuselage section on top of the other. This two-deck arrangement allows unusual versatility in utilizing the airplane for cargo.

(*Quartermaster Training Service Journal*)

New Army Glider:

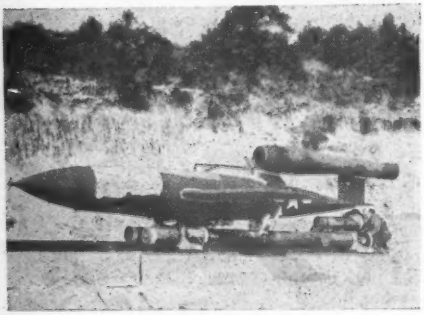


This cargo glider of unusual design is undergoing flight tests conducted by Air Technical Service Command.

(Official photo, U.S. Army Air Forces)

Air Force Robot Bombs:

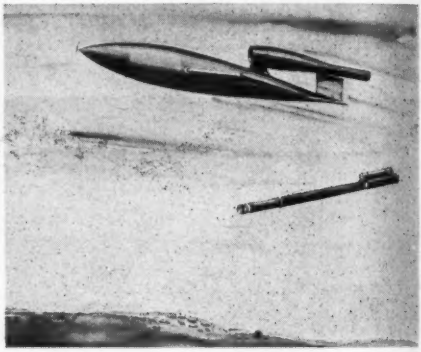
The American version of the robot bomb, produced by manufacturers in this country following submission of specifications worked out by Air Technical Service Command



MAN PREPARES TO FIRE ROCKETS WHICH WILL LAUNCH ROBOT BOMB INTO THE AIR. (Photo from *Air Force* magazine.)

technicians, attains a speed of 440 miles per hour at an altitude of 6,000 feet and has a theoretical range of about 150 miles.

The high explosive warhead weighs more than one ton and the fuel tank carries in excess of 150 gallons of gasoline. Compressed air bottles are also necessary. Launched with special launching rockets which are automatically discarded when a speed of 260 miles an hour is reached, the robot continues over a pre-set course by means of jet propulsion.



ROBOT BOMB IN FLIGHT. EXPENDED ROCKETS AND LAUNCHING CAR DROP TO THE GROUND.

An air log propeller registers the miles until the predetermined distance has been covered, at which time the robot dives toward its target. An autopilot maintains stability and a magnetic compass keeps the robot on its course.

The version of the weapon now being tested by the AAF, while partly based in construction on the German V-1 which has been effective only under certain conditions, is expected to prove a much more deadly and accurate weapon.

(*Army and Navy Journal*)

More Hospital Ships:

Five more troop ships will be stripped of their armament and converted into United States Army hospital ships in order to insure speedier return of America's wounded. Addition of these new ambulance-type hospital ships will bring to twenty-nine the number of such vessels operated by the Transportation Corps, Army Service Forces. The twenty-nine vessels will have a total capacity of more than 18,000 sick and wounded.

(*Army and Navy Register*)

FOREIGN MILITARY DIGESTS

The Volkssturm Organization

Translated and digested at the Command and General Staff School from a German article by Herbert Hahn in *Völkischer Beobachter* 25 November 1944.

THE Volkssturm [People's Army] is growing, battalion by battalion, throughout all the districts of the Reich, and some of its units are already in contact with the enemy in the threatened areas of the frontiers. Such a rapid growth of the organization is the more astonishing since in this instance we are dealing not with an expansion of the Wehrmacht by means of cut-and-dried methods, but rather with the creation of a unique combat organization.

In the organization of the Volkssturm we were faced with the problem of getting men under arms as quickly as possible, of keeping them at their essential tasks in civilian life up to the moment of direct local threat by the enemy, of giving them military training, and of combining them into military organizations at the same time. It is this that gives the Volkssturm its unique double character. It has both an economic and a military task, and its center of gravity may be placed either on the one side or the other according to whether one emphasizes its defense duties or its extraneous functions. The Führer's decree concerning the organization of the German Volkssturm, therefore, places training, equipment, armament, and combat employment in the hands of the commander of the Replacement Army (*Ersatzheer*), and political leadership and organizational structure in the hands of the Party. The Party controls the Volkssturm through Gauleiters and small district leaders (*Kreisleiter*) who are responsible in their districts "for the command, conscription, establishment, and organization of the German Volkssturm." They also participate, in accordance with this authority, in the selection of leaders, for whom the basic requirements are military ability, determination, and loyalty to the Führer; good example in all matters pertaining to war and life in general; adaptability to Spartan simplicity; honesty in making reports; and freedom from the propensity to magnify, minimize, or remain silent in matters of importance.

The defense of the homeland is a matter which concerns the entire nation. For this reason, the Volkssturm, in each of its units, is representative of the nation in its entirety. The necessity for leaving the men who are to be trained in their civilian occupations permits of no other form of organization than one based on the regional organization of the National Socialist German Workers Party [Nazi Party]. Hence, in organizing the groups, platoons, companies, and battalions, the unity of the "blocks," "cells," community groups, and districts is preserved as far as possible.

There is no adoption of organized units from the various branches of the Party, Party organizations, or other groups; neither are there any special white-collar groups or groups made up exclusively of men of certain vocations. This, however, does not apply to fixed personnel of railway lines or of municipal transportation systems, or men employed on interior waterways or in the waterways administration service.

The main problem, the double aspect of which makes the authority of Gauleiters and small district leaders (*Kreisleiter*) indispensable, is without any doubt that of obtaining both a complete defense effort from the German nation and at the same time the continuation of essential tasks in connection with food service, transportation, communications, and leadership in general, with as little interference as possible. This consideration of the vocational activities of the Volkssturm soldiers, which cannot be entirely neglected even when the men are called into combat duty, has resulted in the establishment of several categories of conscription, depending both on physical fitness and vocational dispensability.

As regards fitness, naturally the most rigid standards must be observed. Limited-service men find employment in security and guard duty. In doubtful cases, a physician selected by the district leader makes the decision.

The sixteen to nineteen-year-old youths are also inducted in a special draft. Since they are members of the Hitler Jugend and would naturally go next into the Wehrmacht, a more severe course of training is given them.

The degree of vocational dispensability is decided by the Party officials in accordance with reports from the individual's district board. The employment of Party political leaders in the Volkssturm is on a scale which will assure success with respect to command and leadership under all conditions and in the most threatening of situations.

The various conscription categories do not differ so much in thoroughness of training or in equipment as in type and distribution of tasks and time of combat employment.

The German Volkssturm has no large staff or service of supplies, and inasmuch as it is employed in locally restricted tasks or in battalion strength at most along with regular Wehrmacht units, it does not form its own field divisions. There exists, therefore, besides the Volkssturm soldier, only group, platoon, company, and battalion leaders who are identified by from one to four silver stars on their collar ornament. Wherever Party, Wehrmacht, or other uniforms are worn, former service grade insignia are to be removed in the Volkssturm service. The battalion receives a flag which is carried in combat. It bears the number of the district (Kreis or Gau) on a black background.

Main emphasis in training is laid on firing, close combat of tanks, camouflage, demolition by the use of explosives, and the building of obstacles. This training is given at least once a week, usually several hours on Sunday. In the matter of equipment (at least temporarily), the members of the Volkssturm will to a large extent be dependent on makeshift means and means of their own procuring. In addition to all uniforms and equipment in the possession of the Party, private articles of clothing and equipment which are not used at the present time by their owners will be commandeered. The idea is not so much that of a general requisition of these articles as that of voluntary, neighborly help with the character of a house-to-house collection.

The German Volkssturm does without some of the organizations that are indispensable in larger military units and which tie up considerable forces and keep them from actual combat duty. It limits its own medical services to that of companies and battalions. From time to time, "physicians in charge" in the Reich's district organizations conscript physicians and other medical personnel and are responsible for the health of the Volkssturm. Doctors who are liable for service in the Volkssturm are employed in the medical service only. There is a doctor for every battalion and a medical noncommissioned officer for every company.

The German Red Cross has charge of the equipment and medical supplies, along the lines commonly followed in the case of the regular troops. When engaged in combat with Wehrmacht units, Volkssturm soldiers are also cared for by army physicians.

During the period of training, the Volkssturm soldier provides his own food or is subject to the usual rationing. In case of training in camps for more than three days, in order to avoid double apportionment of

food a "Leave of Absence Certificate for Community Camp" is to be obtained from the local Food Office. In combat duty, the Volkssturm units are fed with the troop units under which they are fighting.

In case of a period of training lasting for several days, compensation for the civilian task in which the man is engaged is continued, and time lost does not have to be made up. Service in the German Volkssturm is a service of honor of the highest order, in which speculations relative to material advantages or losses are entirely out of place.

In case of accidents while in the service or disability incurred in combat, there exists provision for assistance to families and other dependents and for social and vocational security.

The Strategy of the Battle of the Ardennes

Digested at the Command and General Staff School from an article by Lieutenant Colonel Alfred H. Burne in *The Fighting Forces* (Great Britain) February 1945.

EVER since September the whole of the Eiffel front had been remarkably quiet when, on 17 December, a rather curiously worded Shaef communiqué reported a number of apparently secondary German attacks. The number of tanks, we were told, did not exceed a division in strength. It was only gradually that the full import and power of Model's attack was disclosed.

The fact is, the German commander had succeeded, without arousing Allied suspicions, in concentrating twenty divisions on a front of almost exactly sixty miles by map (all distances are given by map in this article). That gives one division per three miles. If we assume that the Americans could oppose a force of six divisions, that gives them one division per ten miles.

Under the circumstances it is not surprising that Model got a good flying start, and by 22 December he reached the line of flood tide (see sketch) and had penetrated within four miles of the Meuse at Dinant. But for three splendid stands by American troops, he might have got much farther. In the first place, the two flank bastions—Montjoie (Monschau) to Malmédy, and Echternach—stood firm, thus contracting the frontage of attack. In the second place, St. Vith, a big road junction, held out for several days, thus denying the enemy some important arteries and splitting up their attack. In the third place—and most important of all—**Bastogne refused to fall. This** also was an important road center in an area where good roads were at their fewest. The panzer advance swept round it, like an incoming tide sweeping round an outlying rock and coverting it into an island. Fortunately, the frontage on which they bypassed the town to the south was so narrow that there was little power in this part of the blow. But the situation was ugly in appearance—if not nerve-shattering.

The Commander of the 21st Army Group acted promptly, resolutely, and confidently as soon as he heard of the German breakthrough, and his action had an incalculable effect upon the morale of the Allied forces. General Patton (or General Bradley) seems to have acted promptly also. To switch from attacking in one sector to counterattacking or defending in another is a difficult operation of war—especially on the logistical side. Yet his presence on the southern side of the "bulge" made itself felt on about the seventh day of the battle, and on 27 December he achieved the signal success of relieving Bastogne, thus forming that peculiar Bastogne pocket.

By 22 December our troops had established themselves along the line of the Meuse between Namur and Dinant, and held all the bridges. From there they advanced a few miles east along the prominent ridge running from Dinant to Ciney. Just east of this town, USA troops were in contact with the panzer spearhead and, backed by our airborne troops

on the ridge just behind them, they prevented any more forward movement.

Simultaneously, about four miles to the southwest they succeeded in cutting off and then cutting up the panzers who had penetrated to Celles. High tide had come!

If the reader will now look at the sketch map he may pick up a good deal. At least six points can be noted from it:

1. The curiously symmetrical shape of the attack. A perpendicular from the center of the start line crosses the point of deepest penetration opposite Givet.

2. Both start line and perpendicular are almost exactly sixty miles in length. This gives the advance a speed of sixty miles in seven days, i.e., eight and a half miles per day—not particularly fast, judging by previous panzer attacks in this war.

3. The advance was brought to a halt just short of that belt of fairly open country in which the famous battles of August 1914 were fought.

4. The direction of the axis of advance was at about an angle of seventy degrees to the direction of Antwerp—the reputed objective.

5. The importance of the Bastogne "island," and later "bastion," is clearly shown. It badly cramped the style of Model's attack.

6. The line attained was roughly parallel to the line of the River Meuse on all three sides.

From the above it would look as if the line of the Meuse was the objective—not Antwerp. There are other considerations pointing in the same direction.

In the first place, it is hard to believe that Rundstedt can have so far miscalculated as to suppose that a mere twenty divisions could force their way to Antwerp. Especially is this the case when the attack was comprised in a *single blow.* Long before it reached Antwerp it would run its head into a veritable hornets' nest, converging on it from north and south. Indeed, the hornets' nest became very evident before ever Model reached the Meuse. It would have been another matter if a *double* blow had been struck, spaced thirty to fifty miles apart—say at Roermond. The history of this war seems to show that *single* blows do not produce decisive results. This double blow was utilized four times in 1939 in Poland, operating on true exterior lines. The Russians employed it on the bends of the Don, Donetz, and Dnieper. In the Dunkirk campaign the natural position on exterior lines was not present, so Rundstedt had to create it for himself, his left hook passing through Sedan and his right hook (ten days later) along the Belgian coast. Similarly at Tunis, General Alexander had to create the condition by a double blow to Tunis in the south and Bizerte in the north. Montgomery did the same at Falaise.

Our advances to Antwerp and Arnhem may appear an exception to this general rule, but in the former case the Royal Navy on the sea in effect formed the second arm of the "pincer."

It is true that Rundstedt did strike a second blow, but (1) it was fifteen days after the first blow—too late to affect the issue by pinning Patton to his own front; (2) it was too distant from the first blow (seventy miles) to make a double envelopment feasible; (3) it was the wrong side of the Ardennes—away from instead of towards Antwerp.

If Rundstedt really intended to get to Antwerp, it seems incredible that he should have expended valuable troops on an eccentric move in Alsace. His strategy in this campaign was probably copied from that successfully applied by the Russians last summer—a succession of attacks from north to south, fairly widely spaced in time and space, each tending to create a vacuum to the south of it, into which the next attack penetrated. This reminds one of Alice's shop in Wonderland, where each locker in turn became mysteriously empty. I call it "The Alice Strategy." It is very similar to the "Haig Strategy" of 1918.

A further reason which makes me doubt if Antwerp was the real objective is that no powerful attack was made between Grandmenil and Ciney. After the failure at Malmédy, and the abortive dash for Liége, something of the sort was required if Rundstedt really meant to get Antwerp.

I admit that there are two opposing considerations that puzzle me. The first is the confident and almost universal assertions of our war correspondents: have they solid evidence on the point which they have not disclosed? The other is the terms of Rundstedt's order to his troops, which seemed to indicate that he really believed his offensive might end the war. Prisoners' stories confirm this. Hitler is reported as saying that he would be in Antwerp in three weeks. He may have said this, and Rundstedt may have felt strong enough to disregard it—in secret agreement with Keitel.

But if Antwerp was not his real objective, what was? I believe it was simply the line of the Meuse from Liége to Sedan. Along most of its course, the southern and eastern bank dominates the other; the river is roughly one hundred yards wide and, with semi-precipitous cliffs several hundred feet high along the greater part of its course, it forms a very strong natural line. Rundstedt might well hope to hold on to it for two or three months. This would take him into the spring; it would give breathing space in which to develop more secret weapons and, most important of all, it would give more time for the Allies to fall out among themselves. Time, the Germans believe, is on their side.

The first stage in our come-back was the relief of Bastogne by Patton's Third Army. This made the "neck" of the Bastogne pocket from Longchamps [north of Bastogne] to Grandmenil just twenty miles. Inside this pocket the Germans were in a hopeless strategical position.

Only two first-class roads fed it through the "neck," while the Allies, operating on exterior lines, could approach it by no less than fifteen first-class roads—nine between Malmédy and Dinant, and six between Dinant and Bastogne.

The situation became similar on the surface to the Falaise pocket. This similarity increased when it was seen that the southern arm of the pincers—Bastogne (corresponding to Argentan)—so far from advancing had to fall back slightly. It became all the more important that the northern arm, through Grandmenil, should act with all the greater power and speed if many Germans were to be cut off inside the pocket. But this did not happen, and by 10 January practically all the Germans had been extricated with, under the circumstances, remarkably small losses in prisoners and material. How did this come about?

There seem to be four main reasons:

1. Divided command. Montgomery commanded on the northern face, Bradley on the southern. The essence of an operation on exterior lines is ***simultaneity.*** It is obvious that a single control should operate over the whole battlefield to ensure that the required degree of simultaneity is attained. But the peculiar

thing is that practically all the critics have accepted, and even praised, this arrangement. Owing to the disruption of communications—such is the contention—the split was inevitable.

2. No such heavy hammer blow descended on the Bastogne "anvil" as descended on the Argentan anvil. Information is scanty at present, but three first-class roads feed Grandmenil from the north and northwest, and the woodlands around should provide cover for a force that is massing. It is true that the roads on the south side of the town diminish in number and quality, and the terrain round the Fraiture crossroads is boggy and difficult. Perhaps the troops were not available in sufficient numbers. Certainly no British troops (such as those who provided the Falaise "hammer") were there. How was this? I think it was because our troops were in the first place sent to line the Meuse, and having come into action east of Dinant the remainder of our line was built up on them. Now on 24 December the most critical part of the line was the tip of the penetration, and it was natural to send our men there. But the moment the tide turns, the tip becomes, not gradually but in an instant, the *least* important place and the jaws of the pocket become the *most* important.

Thus from 25 December onwards our troops, by the force of circumstance, found themselves in one of the least important sectors of the line. One can regret that fact without in any way meaning to disparage the USA troops.

3. The weather was against us. Clouds, mist, and snow handicapped our air force at a critical stage in the operation, whereas at Falaise the weather favored them.

4. The long winter nights make withdrawal easy. The Germans are given much praise for their skilful withdrawals, but in point of fact, unobserved withdrawals are nearly always comparatively easy.

The timing of a counterattack is bound to be one of the most delicate and difficult operations of war. On the one hand, every minute lost means stiffer resistance—more mines laid, etc.—when the blow is eventually delivered. On the other hand, a blow which is delivered at "half-cock" is worse than useless. The German doctrine recognizes this and lays down that a local counterattack must be immediate, but a general counterattack must be carefully and deliberately planned. Field Marshal Montgomery seems to endorse this doctrine. But it would be dangerous to make a rigid note of it. If, for example, Patton had employed it and had delayed in relieving Bastogne, his eventual blow might not have been delivered till Model was established on the Meuse.

One cannot withhold a mead of professional appreciation of the cool brain and accurate calculation that Model must have exhibited during those harassing days from 24 December to 9 January, when he clung tenaciously to the bulge in spite of all the theoretical reasons that must have incited him to quit.

"He laughs longest who laughs last," and just as we received a nasty shock at the Kasserine Pass and lived to profit by it, so I think that though we have had a nasty shaking up we shall profit by it in ways that need not be specified here. And on the "other side of the hill," just the contrary result is to be expected. "Pride goes before a fall." The Germans were worked up by Rundstedt to a high pitch of self-confidence and arrogance. The reaction should, by all the laws of nature, be equal and opposite.

Notes on the Preparation of Breakthrough Operations

Translated at the Command and General Staff School from a Russian article by Colonel P. Boldyrev in *Krasnaia Zvezda* (Red Star) 16 November 1944.

ACCURATE reconnaissance and proper employment of engineer troops play a very important role in the successful breaching of strongly fortified positions. The most important mission of reconnaissance agencies is to study all fortifications; for the artil-

lery, the aircraft, and the sappers should be supplied with information concerning their type, location, construction, embrasures, zones of fire, armament, the nature of obstacles on the approaches, etc.

It is undoubtedly difficult to reconnoiter deliberate fortifications. But it can be done. At Leningrad and Sevastopol, for example, our scouts located up to seventy-five percent of all the deliberate fortifications in the sector of the main attack.

Serious attention should be paid to ground observation. Ordinarily, it is conducted uninterruptedly. It is advisable to augment ground observation by the work of sound-and-flash stations and aerial observation. Our units did this during the breakthrough of the German defenses at Leningrad. Here observation was conducted day and night. It was not discontinued even with the beginning of the attack.

The density of observation posts varies. On the Perekop Isthmus and at Sevastopol, where observation of the enemy defenses was relatively easy, there were three or four posts per kilometer of the front. Each post was assigned an observation zone from 300 to 400 meters wide. The number of posts on the Leningrad front exceeded this. Not infrequently, observation posts were established to study separate objects, such as big buildings, separate enemy fortifications, etc. A divisional sector had, on an average, from eight to twelve posts. A battalion located in a sector with good visibility had one observation post in the vicinity of the command post (300 to 400 meters from the enemy) while close terrain called for an additional post. The headquarters of an infantry regiment usually had two posts; the division, one.

The location of enemy fortification works can be disclosed by observing the following: embrasures, flashes from firing guns, dry or burnt grass, mounds, cut-over forest, paths, etc. The Germans carefully camouflage their deliberate fortifications and build many dummy works. The observers should keep this in mind. On the East Prussian border, a number of well equipped fortifications were not manned—they were, in effect, dummy fortifications. At the same time, there were reinforced concrete fortifications nearby, skilfully camouflaged to look like wrecked tanks or trucks.

Scout-observers should be employed on a large scale. Operating in groups of from three to five men, they penetrate into the enemy's dispositions at night and conduct observation for several days, if necessary. Whenever the situation makes it impossible for them to penetrate into the enemy's dispositions, they can be planted there during a reconnaissance in force or under a cover of artillery and bomber aviation.

Command reconnaissance is of special importance. The battalion, regimental, and division commanders should visit their observation posts systematically and personally study enemy defenses.

Experience has shown that reconnaissance in force is the most effective method of reconnaissance. It is conducted either by reconnaissance groups approaching the enemy fortifications under the cover of darkness or by strong infantry forces supported by tanks, artillery, and aviation. Both include, as a rule, reconnaissance officers from artillery, tank, and engineer troops. Reconnaissance in force of a strongly fortified position results frequently in the capture of separate enemy fortifications or defensive areas. In such cases the engineers operating with the reconnaissance groups blow up the captured fortifications. With the beginning of the reconnaissance in force, the ground observation personnel is augmented, mainly by staff officers.

The best way to uncover the location of deliberate fortifications is to use artillery and aircraft fires, which "decamouflage" them. This is done strictly according to the plan worked out in consultation with the artillery commander. After the camouflage effect has been removed and fortifications are clearly observed, the artillery starts its work of destruction. Should the artillery fail to destroy an uncovered emplacement, the latter should be fired upon systematically in order to prevent the enemy from restoring its camouflage.

Photography is the basic means of aerial

reconnaissance. In most cases the entire fortified zone is photographed. On the Leningrad front, for example, before the beginning of the breakthrough operations, the whole area was photographed three times: before the plan of the breakthrough was worked out; seven or eight days before the attack; and, finally, a day or two before the beginning of artillery preparation. Newly uncovered targets were plotted on the map. Aerial photographs were usually taken from various altitudes. The photographs of the sector for the main attack were of a larger scale.

Now let us examine the role of the engineers. Their most important mission is to bring the attacking troops as close to the enemy main line of resistance as possible, thus reducing unnecessary losses and insuring the success of the attack. For this purpose, trenches are dug in front of our position. At Praga, for example, the digging of trenches enabled some of our units to approach to within fifty to seventy meters of the German fortifications. At Stalingrad we managed to lead our trenches right up to the German fortifications. Such an approach enabled our infantry to destroy enemy emplacements literally within a few seconds after the beginning of the assault. In digging trenches, the direction of enemy fire must be taken into account. Trenches should be built in a direction perpendicular to that of the embrasure of the nearest fortification, and dug in short sections.

Although the digging of trenches is very difficult, this should not interfere with the completion of the mission. During the offensive of January 1944, the troops of the Leningrad front dug trenches by blowing up frozen ground, often under enemy fire. This work was well worth their while, since it contributed to the success of the attack.

Sapping has proved to be the best method of digging trenches. Another method, used at Vitebsk, is this: Under the cover of our aviation and artillery fire, our infantry dashes forward, hits the ground, and starts digging foxholes, which are later transformed into trenches and then connected with the old position by means of communication trenches. This method insures the fastest approach to the enemy. The third method of building trenches is by blasting, which was used successfully on the Leningrad front. This method must be used in frozen or stony ground. The blasting is done as follows: At night the sappers set blasting charges over a considerable area of the neutral zone and then blow them all up simultaneously. A deep ditch is thus formed. Under cover of artillery fire or darkness, the infantry occupies the ditch, clears it of loose dirt, and organizes it for defense.

In order to conceal the direction of the main effort, approach trenches leading close to the enemy defenses are built on a broad front. As a general rule, the digging of these trenches is done by troops defending the given sector.

All fortified areas are saturated with all types of mines, booby traps, and other obstacles. In some areas the Germans laid from 4,000 to 6,000 mines per kilometer of the front. Hence, the importance of making passages through these obstacles is obvious. We have learned that it is not advisable to make passages six, eight, or more days before the beginning of the attack, for the enemy can restore his obstacles. On the Leningrad front, for instance, the sappers started making passages only two or three days before the beginning of the offensive. In certain sectors, passages in the mine fields and barbed-wire entanglements were made only on the eve of the attack. The sappers did not remove the mines from the ground, but disarmed them by unscrewing the fuzes. This speeded up the clearing of the mines and, what is more important, fooled the enemy, since the surface of the mine field remained unchanged.

At Sevastopol, Praga, and in other battles, barbed-wire entanglements and separate mine fields were frequently destroyed by sympathetic detonation, artillery fire, and aerial bombing. By dropping medium bombs, our bombers can easily make passages in mine fields, and if fascines are then thrown over the shell holes, tanks can drive over without any difficulties.

There were cases when the enemy succeeded in re-mining the areas cleared by our sappers. The passages should, therefore, always be guarded by specially detailed submachine gunners and mortar crews. The passages should be checked during the night preceding the attack.

If, because of the nature of the terrain or the increased vigilance of the enemy, it is impossible to make passages without being noticed by the enemy, the work of the sappers is protected by artillery fire and, if necessary, also by the aircraft. Smoke screens should be used extensively.

Special attention should be paid to the study of mine fields established by the enemy in the depth of his position, directly in front of his deliberate fortifications, and between them. In East Prussia the Germans lay lots of mines and hardly-noticeable obstacles around their emplacements. In many sectors they dig large antitank ditches. If it is impossible to make passages in the obstacles before the attack, it should be done at the beginning of the action. In such areas it will be necessary for infantry and tank units to have sapper detachments.

Battle experience has shown the necessity for a well-organized military police service in the passages. Near Leningrad, for example, the officer in charge of the military police (usually one per infantry regiment) was responsible for the movement of tanks and infantry through the passages, the guarding of the passages, and their widening for the use of second echelons. A sapper detachment was at the disposal of the military police.

Flying in Burma

From *Britain* (British Information Services) March 1945.

JAPANESE skeletons littering the roads deep into Burma are the grim evidence of the spectacular success of the Third Tactical Air Force in their relentless war on enemy supply lines during the worst monsoon weather for years. During the past months the combined British and American Eastern Air Command strangled Japanese traffic by road, rail, river, and sea, and starved the forward troops to death.

"The Japs had no choice. They just sat down and died. Their food and medical stores exhausted, supplies cut off, air-dropped supply frustrated by the vigilant fighters, thousands died of starvation whilst our own troops had everything in plenty—thanks to the RAF and U.S. AAF." This is how a senior Army officer described it. How the battle of the rains was won is told by pilots whose flying adventures over Imphal and Arakan, the Chindwin and the Irrawaddy, are more hazardous than on any other battlefront.

Nature plays an uncanny game with aircraft in these regions. Changes occur with treacherous suddenness, and pilots may suddenly find themselves in one of the dreaded "Cu-Nimbs," the cumulus nimbus—the turbulent cloud formation which spells danger to any but the most experienced flier. One Spitfire pilot hit one of these black pillars of cloud and before he knew what had happened, found himself floating through the air with bits of his aircraft flying around him "like dancing matchsticks," as he described them.

A Hurricane pilot was flying over the Mandalay road, looking for his target, when "suddenly hell broke loose." He was hurled up "a black shaft scintillating with sharp flashes along dark walls of cloud." His instruments failed, his aircraft "shuddered and shook, creaked and shivered." How he got out of the inferno is still a mystery to him.

A Vultee Vengeance, madly tossed about in one of these clouds, turned turtle. The air gunner, suddenly suspended in mid-air on his safety belt, thought it was time to bale out. He arrived back at camp three days later after a long jungle trek to find his pilot still wondering how he lost him.

Many aircraft, including B-25's (Mitchells) and Dakotas, were sucked up some 10,000 feet

whilst officially—that is, according to instruments—flying perfectly level. Then the crews would feel a sensation somewhat like "going up an express elevator of the Empire State Building and coming out through the roof."

Pilots have found these clouds, rooted in deep, narrow gorges, towering to 35,000 feet. They could not fly over or round them and had no chance to turn back. They would be suddenly whirled into blinding rainstorms, in which the compass starts spinning; just as suddenly they find themselves in a calm and clear void, with lightning and dense rain in the distance. They talk of St. Elmo fire—blue flames dancing over their wings, their propellers seeming alight, and the interior of the aircraft brilliantly illuminated.

Vultures, hawks, crows, and thousands of waterbirds in flight can be dangerous. Beaufighters attacking shipping in the Bay of Bengal often have to fly through swarms of long-legged white birds over the river deltas. They rise like a cloud when they hear the approaching aircraft; the sky looks "like after a pillow fight, with feathers whirling round like snowflakes." One Beaufighter returned with a large buzzard which had rammed the aileron wedged into the leading edge of the port wing. A Hurricane hitting a hawk got into a spin and crashed.

Vultures are the most dangerous "heavies" of Nature's jungle air force. Stoically they glide over the forests, quite oblivious of aircraft, leaving avoiding action entirely to the pilot. One station had to scare vultures from the runway by firing Very lights at them.

Nature, too, adds to the adventures of flying over the Burma fronts by the onslaught of its "midget" air force—the flies and mosquitoes.

The enemy's ground defenses include tripwires across rivers and valleys, machine-gun nests in trees, and the "suicide defense" of blanketing a target with heavy ack-ack exploding as low as fifty to a hundred feet above the ground—a barrage as dangerous for the gunners as for the attackers. But neither these nor his fighters are so much feared or cause more casualties among our low-flying aircraft than the rigors of monsoon and jungle conditions.

We owe a lot to the valiant work of the Air Force's ground crews. Incessant rains or scorching heat have made repair and servicing a severe test of human endurance. Aircraft can take off or land in most weathers, but mechanics cannot get at the engines in the rain. In tropical conditions, corrosion sets in within minutes. An engineer officer of a transport squadron decided that the best method to keep the aircraft serviceable was —to fly them, to prevent corrosion in the rain.

Sometimes the sun is so fierce that no work can be done on the aircraft in normal working hours. An egg cracked on the wing would "set" almost immediately: it was impossible for fitters to climb on to the aircraft. Inside the fuselage of bombers or Dakotas, crews could only work in short spells in a temperature like that of a baking oven.

Few RAF pilots have seen the Japanese, on the ground or in the air. Nature helps the enemy in the matter of camouflage. Maps often bear little resemblance to actual ground conditions, for hills and rivers are not always correctly charted; seasonal waterways, created by floods, are not shown. Coloring and outline of landscape will change from hour to hour.

Landmarks are difficult to find when green valleys turn into brown rivers overnight, or yellow patches into green fields. Clouds, waterspouts, and ground mist make it even harder to find a target well camouflaged, as it always is, in dense jungle or overgrown waterways. Yet thousands of trucks, river boats, railway trucks, and enemy hutments have been destroyed from the air just the same. Sometimes the pilots attacked "invisible" targets, pinpoints given to them by Army observers.

On one occasion a reconnaissance reported 200 Japanese with mules in the hills. Ground crews were instructed to fit special long-range tanks on the Spitfires, and worked all night by the light of truck headlights. At dawn the squadrons took off, but they returned disappointed, "Not a thing to be seen"; so the pilots had sprayed the jungle with their guns. Next morning a ground patrol reported seven-

ty Japanese soldiers dead and fifty mules killed in that particular area.

Six Hurricanes returned from their sortie over the jungle, where they bombed a certain area, with the unanimous verdict, "Waste of time. Nothing at all to be seen." The Army signalled shortly afterwards: "Air attack most successful. Several hundred Japanese casualties." Burmese villagers, their raw shoulders as evidence, reported that they had had to evacuate enemy casualties for twenty-four hours after the sortie.

As I said, few airmen have a chance actually to see the enemy; but sometimes they come across a "dream target." There was a congestion of enemy soldiers, for instance, waiting to use a wire trolley-bridge across the Chaung River. It could take only two men at a time. The Spitfires killed a hundred who were waiting their turn.

Returning from a raid on shipping, a Beaufighter crew saw Japanese soldiers lined up on a road. Turning around, they mowed them down before the parade could be dismissed. Later it was confirmed that they killed near a hundred Japanese officers under training.

Another Beaufighter saw some Japanese bathing in the sea. When the plane turned about they scurried for shelter, so the Beaufighter promptly set the whole camp on fire.

On the Tiddim Road there are hundreds of wrecked enemy vehicles and many tanks which have been destroyed by bombs or cannon shells. A staff car which had been strafed by Spitfires was found under a tree south of Tamu. Inside were the remains of a Japanese general and his aide de camp.

These incidents are all representative of the pattern of flying operations by the Tactical Air Force in Eastern Air Command. They form part of the mosaic of a picture which in its sum portrays a supreme effort by flying men and ground crews in braving the monsoons, undeterred by hazards and handicaps. Here was an air victory achieved under conditions in which flying has never been attempted before, conditions in which, on a more "normal" battlefront, flying would have been cancelled most of the time.

The Struggle for the Varanger Fiord

Translated and digested at the Command and General Staff School from a Russian article by Commander A. Troshin in *Krasnyi Flot* (Red Fleet) 14 November 1944.

THE Varanger Fiord is an extremely important area of the North (see Figure 1). Its ports—Petsamo, Kirkenes, Vadsö, and Vardö—are open to navigation all year around and are suitable for large ships. Using this region as a base for his naval forces, the enemy harassed our shipping and successfully defended his lines of communications, which were used to supply the German troops in the north with ammunition, arms, fuel, and food. These ports were also used to export nickel and iron ores from the Petsamo area.

The Varanger Fiord was occupied by the Germans long before the beginning of the war with the Soviet Union. In Petsamo and Kirkenes, the Germans had built good bases for their naval forces. The ports were for-

FIGURE 1.

tified, and considerable numbers of coast artillery and antiaircraft guns were installed near the entrances of the fiords. The Varanger Fiord was looked upon as a springboard for the invasion of the Soviet Arctic Region. But the plans of the "blitz" conquest of the Soviet North had failed, and the enemy's mountain infantry divisions were forced to shift to defense.

The importance of the Varanger Fiord, however, did not diminish. The Germans had mined the sea and the approaches to their bases, and had blocked the entrances of the ports with antisubmarine nets. Their ground defenses included earth-and-timber emplacements, concrete machine-gun nests, mortar and artillery positions, various obstacles, and mine fields.

The weather and the terrain make the operations of ships, aircraft, and ground forces difficult. The entire coast line is dented with numerous large and small fiords with high, steep granite cliffs, almost completely barren with patches of snow in winter and summer. All approaches are dangerous, and it is almost impossible to find a suitable place for landing. Landing operations in the Varanger Fiord are extremely difficult and call for a special skill and great courage.

The polar day and night also influence the operations of the Navy. Visibility is often limited by fog. Storms are frequent, and aircraft and small ship operations are particularly difficult in fall and winter.

The month of October 1944 marked the final phase of the stubborn fighting for the Varanger Fiord. The troops of the Karelian Army Group broke through the strongly fortified German defenses and began advancing in the direction of Petsamo. At the same time marine units pierced the German defense line in the Srednii Peninsula and advanced along the coast.

On the night of 9-10 October, the first landing party went ashore east of Petsamo (see Figure 2). The weather made the operation difficult. The temperature rose and fell alternately, varying from below zero to about 8 or 9 degrees centigrade (from below freezing to about 46 or 48 degrees Fahrenheit). The sea was rough and the southwest wind was very strong. At times the visibility was close to zero. Snow which had fallen the day before had melted.

It was decided to land the troops from torpedo cutters and patrol boats. This decision was motivated by the following considerations: navigation difficulties would make the landing from large ships very difficult; small vessels could more easily penetrate into the bay and overcome its numerous under-water obstacles; small ships would be less vulnerable when fired upon from the shore and, what is more important, would not require special landing equipment.

The Germans were taken unawares. They opened strong but poorly organized artillery fire on the approaching ships, but were unable to offer organized resistance. The landing parties reached the shore without any losses in men or ships.

It should be noted that, in order to divert the enemy's attention from the main landing operation, a diversionary landing was made in another sector.

The landing of the marines and their operations on the shore were supported by our coast artillery units. Whenever weather permitted, our aircraft also participated in the operations.

By a combined blow of the landing parties and of the marine units attacking from the Srednii Peninsula, the enemy group in the isthmus area of the peninsula was defeated. Our troops soon reached the road leading to Petsamo and cut the enemy's route of retreat.

At that time the troops of the Karelian Army Group were approaching Petsamo from the east and south, while the retiring Germans were concentrating in the Petsamo area. They planned, in the event they could not hold Petsamo, to escape to the north and west by sea. It was the mission of our Northern Fleet, therefore, to cut the enemy's lines of retreat by sea and by land; and since the right flank of our ground forces was gradually moving westward, this flank also had to be protected from the action of the enemy forces retiring toward the gulf.

It was necessary to blockade the coast and, pressing the enemy in from the shore, drive him under the blows of our ground forces.

In order to prevent the enemy from evacuating the Petsamo area, and to help the units of the Karelian Army Group capture Petsamo, the Northern Fleet organized the successfully carried out another landing operamari, therefore, the landing party had to break through their fire. On 14 October other landing parties captured the batteries. Our ships could now enter the port freely while the enemy was kept out.

On 15 October the troops of the Karelian Army Group, in close cooperation with the ships, aircraft, and marines of the North-

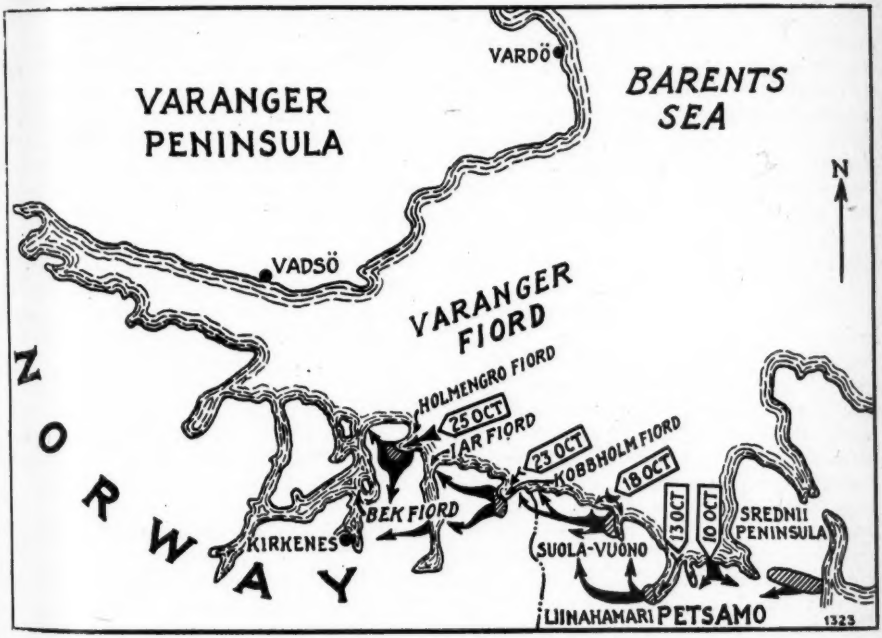


FIGURE 2.

tion. On the night of 13 October, the marines landed in Liinahamari (port of Petsamo). The landing from torpedo cutters and patrol boats was preceded by an artillery preparation by our coast artillery batteries. The enemy offered furious resistance and subjected us to artillery and machine-gun fire.

The landing party swiftly established a beachhead and started mopping up the port area, at the same time repelling furious enemy counterattacks. On 14 October the port was in our hands.

The entrance to the port was protected by two enemy batteries. To reach Liinahaern Fleet, occupied the city and port of Petsamo. The defeated enemy began retiring to the west along the coast. Moving parallel to the attacking Red Army troops, the marine units advanced along the shore from Petsamo to Kirkenes and mopped up the coast of the fiord. In order to speed up our offensive and prevent the enemy from escaping by sea, the Northern Fleet carried out several landings in the enemy's rear.

On the night of 18 October, the marines landed in the bay of Suola-Vuono and by 18 and 19 October occupied several populated places. On the night of 23 October, other

marine units landed in the Kobbholm Fiord. This landing was also successful. The enemy retired so hastily that he did not even damage the power station in the Kobbholm Fiord. During 23 and 24 October, the marines reached the eastern coast of the Iar Fiord.

On the night of 24-25 October, a landing was made in the Holmengro Fiord. The troops of the Karelian Army Group were fighting at that time on the southern approaches to Kirkenes. The landing party destroyed the enemy machine-gun nests on the shore of the Bek Fiord, captured the entrance to the fiord, and proceeded by forced marches to Jacobsnes (the part of Kirkenes located on the eastern shore of the Bek Fiord). Simultaneously, the marines who had landed in the Kobbholm Fiord on 23 October penetrated into the bay and attacked Kirkenes from the east. On 25 October the second German stronghold in the north —the large naval base of Kirkenes—was taken by our troops.

During operations along the coast, furious fighting was raging in the Varanger Fiord. The Northern Fleet, in addition to the landing operations, blockaded the fiord, thus cutting the enemy's sea lines of communications. The period from 10 to 25 October was characterized by operations of our surface ships, submarines, and especially aircraft engaged in attacks on enemy shipping. Whenever weather was favorable, our naval aircraft attacked German convoys both in the Varanger Fiord and in the Barents Sea.

The Germans stubbornly attempted to bring self-propelled barges, transports, and small boats into the Varanger Fiord to evacuate their supplies, the remnants of the defeated troops, and various cargoes from the southern coast of the fiords. But most of these attempts failed. The Germans suffered heavy losses. According to preliminary and incomplete data, twenty transports, sixteen self-propelled barges, sixteen escort ships, ten trawlers, two destroyers, and more than fifty various cutters and motor boats were sunk during the period from 10 to 25 October.

The struggle for the Varanger Fiord, and particularly its final phase, has demonstrated once more the tremendous importance of naval support in the operations of ground forces in coastal areas. Efficient cooperation among the ships, marine units, and troops of the Karelian Army Group was achieved in these operations.

The operation of the Navy developed simultaneously along two parallel lines: landing operations and fighting for lines of communications. The purpose of both activities was to secure the operations of the coastal flank of the advancing ground forces. The landing operations have confirmed the necessity of employing specially trained marines familiar with the given area and adapted to local conditions.

With the seizure by our troops of the southern coast of the Varanger Fiord, and particularly of Petsamo and Kirkenes, the strategic bases in the Varanger Fiord have lost their importance to the Germans, for the naval bases at Vadsö and Vardö on the Varanger Peninsula were valuable to the Germans only so long as they held Kirkenes and Petsamo.

What Can the German Navy Do?

Digested at the Command and General Staff School from an article by Commander Kenneth Edwards, RN, in *The Navy* (Great Britain) February 1945.

AT a time when we are moving more and more of our naval strength to the Far East, it is of great importance that we should make some estimate of the possibilities of what is left of the German Navy. Any such estimate must inevitably be based largely upon guesswork, but there are certain facts which stand out, and we must be very sure that we do not invite an expensive and war-lengthening setback through underestimating the enemy's capabilities.

There has already been evidence of in-

creased U-boat activity, and it seems inevitable that Dönitz—himself a U-boat man—should put great trust in these craft. It is known, moreover, that the Germans have made certain technical improvements in their U-boats and that their building yards have been rapidly constructing what amounts to a new U-boat fleet.

There are two factors which will mitigate against any U-boat offensive of today becoming as dangerous as that of four years ago. The first is strategic and the second, tactical and material.

Strategically, the U-boats are in a far worse position to maintain an offensive in the Atlantic than they were during the years when they held the whole of the French Atlantic coast, and particularly the great U-boat base of Brest. It is well to remember, however, that the war was causing us anxiety and grievous loss before the summer of 1940—that is, before the enemy had the use of the French Atlantic ports—and that the enemy's strategic position for a U-boat offensive in the Atlantic is still better than it was during the first nine months of the war, for the Germans still hold the Norwegian coast and its harbors.

The Germans, too, have not yet been dislodged from all the French Atlantic ports. Although these are isolated, it is more than likely that they contain U-boat stores, and it would not be impossible for them to be supplied with more by air or by supply U-boats. It is probable that the German High Command has already worked out the possibilities of forcing the Allies to reply to a U-boat offensive in the Atlantic by attacking and reducing these isolated German garrisons—minor campaigns which might lead to the dissipation of some of the Allied military and air forces from the main fronts.

In the tactical and material fields there is no doubt that the Allies are far ahead of the U-boats. Methods of hunting and destroying the U-boats have progressed even farther since the great defeat of the U-boat offensive in the early summer of 1942, and there is no doubt that we now possess even stronger forces of escorts and of escort aircraft carriers. The enemy probably hopes that we have fallen victim to overconfidence and have detailed so many of these ships for service in the Far East that the U-boats which he sends out will meet weaker instead of stronger antisubmarine forces.

Against our antisubmarine superiority must be set the developments which Germany has made in the design and performance of the U-boats. We know of the "Schnorkel," which enables a U-boat to remain submerged both on passage and when charging her batteries, and German ingenuity may well have devised other improvements. The "Schnorkel" is certainly likely to prolong the life of a U-boat, but its use entails the sacrifice of the surface speed of the U-boat, and thereby reduces the strategic and tactical capabilities of the submarines. These could, to some extent, be offset by the operation of a greater number of U-boats, but this only within limits. There is, however, another point.

Successive official statements on the U-boat war stressed for several months the growing reluctance of the U-boat commanders to press home their attacks. In other words, the commanding officers showed a marked lack of confidence. That was hardly to be wondered at, considering the rate of losses inflicted, and there is a possibility that one of the chief advantages of the "Schnorkel" may prove to be reflected in a greater confidence among the U-boat men.

While there is no doubt that Dönitz is already committed to a U-boat offensive on an increased scale in the Atlantic, we must not forget that he has at his disposal two other weapons—the remains of Germany's surface fleet, and the small, light craft for which we may use "E-boats" as the generic term.

On paper, the German surface fleet is still quite formidable, but there is a high probability that most of its more important units are out of action as a result of damage, and it seems unlikely that some of them will ever again put to sea. Such a case is the battle-cruiser *Gneisenau*, sister ship of the *Scharnhorst*, which appears to have been at Gdynia

in a semi-dismantled condition for nearly two years. Then there are, on paper, the two "pocket battleships" *Admiral Scheer* and *Lützow*, and the three heavy 8-inch-gun cruisers *Prinz Eugen*, *Admiral Hipper*, and *Seydlitz*. There have been many reports of the damage or destruction of these ships in our heavy bombing raids, and it is very doubtful if more than one "pocket battleship" and one 8-inch-gun cruiser are fit for sea. The *Seydlitz* is something of a mystery, but she remains on the list in default of proof of her non-existence. Another mystery is the aircraft carrier *Graf Zeppelin*. This ship was certainly completed and did her trials, but she never seems to have been used, even in the Baltic. Germany also has four 6-inch-gun cruisers, the *Nürnberg*, *Köln*, *Leipzig*, and *Emden*, and it seems probable from Swedish reports in recent weeks that three of these ships at least are operative.

How does Dönitz propose to use these ships—supposing that he has a minimum fleet ready for sea consisting of one "pocket battleship," one 8-inch-gun cruiser, and three 6-inch-gun cruisers, with approximately one flotilla of destroyers?

Unless the speed of the "pocket battleship" has been increased, he is unlikely to use it in the same squadron as the other ships, for that would reduce the speed of the whole squadron.

It seems likely that, now that the *Tirpitz* and *Scharnhorst* are safely at the bottom, we can discount the possibility of a raid into the Atlantic, particularly as the remaining German strongpoints on the Biscay coast could hardly succor a surface squadron. Nevertheless, we must continue to guard against the possibility of a "suicide sortie" by one or more surface ships. The obvious use of the surface ships would be, of course, as bombarding forces on the flank of the Russian armies resting on the Baltic coast, while at the same time Dönitz may well be anxious to keep his ships to operate off the Norwegian coast in the event of a major Allied landing in that country.

There is, however, another and more serious possibility from our point of view. Recent events on the Western Front have shown that the enemy is extremely sensitive to the threat to the vital Ruhr district and well appreciates that Antwerp is the key to the supply of the Allied armies posing that threat. The convoys taking the sinews of war into the estuary of the Schelde must be very tempting to the Chief of the German Naval Staff, and one can well imagine his military colleagues bringing pressure to bear upon him to institute strong naval action in that area. For this he certainly has the E-boats, and he can supplement the activities of these dangerous little craft with a mining campaign and with the smaller types of U-boats which the Germans are known to be building—almost certainly for North Sea use.

There is a possibility, however, that he may decide to raid down the Dutch coast from the Heligoland Bight to the Antwerp convoy route with light cruisers and destroyers, possibly using his other two ships to create a diversion in the north by attempting a break-out on to the Atlantic convoy routes.

One would hope that such raiding tactics would be very expensive to the enemy, but this is unlikely to deter him if he has no further use for his ships and, in his view, they are directly defending the Reich. They would be difficult to deal with, for the enemy could choose his weather; and they would certainly entail the disposition of far stronger British naval forces in the southern part of the North Sea, where Dönitz might hope to effect some attrition by mines, E-boats, and small U-boats.

To be loyal is to be faithful and true; to be unswerving in allegiance. The fundamental loyalty is to one's country, but this comprises other loyalties, loyalty to the Army, to one's unit, to one's superiors, to one's subordinates, and to one's comrades.

—Major General M. J. Costello in *An Cosantoir*

Soviet Artillery Groups

Translated and digested at the Command and General Staff School from a Russian article by Major General F. Samsonov in *Krasnaia Zvezda* (Red Star) 28 October 1944.

THE organization of control of the artillery is determined by the type of the supported units, the nature of the operation, and the number and type of artillery units assigned to the operation.

The best form of control is that in which each rifle regiment or larger unit is supported by one artillery unit. Such an organization, however, is not always possible, for the number of artillery units participating in the offensive frequently exceeds the number of supported rifle units. In the March operation of the 2d Ukrainian Front, for example, eighteen rifle regiments of one of its armies were supported by thirty-nine artillery regiments; in the June operation of the 2d White-Russian Front, thirty-six rifle regiments were supported by fifty-one artillery regiments. For this reason, artillery units in the above and similar operations have always been grouped into *artillery groups*.

The organization of the centralized control of the artillery according to our "Battle Regulations for Artillery" issued in 1937 is as follows: Each rifle regiment has one *infantry support group* (literally, artillery group of infantry support). This group maintains liaison with its supported regiment and with the division artillery commander. Fire missions of infantry support groups are destruction or neutralization of hostile manpower and fire means, and making passages in antipersonnel and antitank obstacles. Each infantry corps is given a *long-range artillery group* (literally, artillery group of long-range action), which is divided into as many subgroups as there are divisions in the corps. The long-range group fires counterbattery missions and takes care of targets in the deep rear of the enemy. In addition to the above, special *destruction groups* are formed in corps and divisions for breaching fortified zones with permanent fortification works.

There are two basic principles in this organization. The first principle is that artillery groups are formed to accomplish definite fire missions; the second, that artillery groups are found only in regiments and corps. Thus a commander of an infantry division will have to use the infantry support group of one of the adjacent regiments to give additional support to one of his regiments. Likewise, to influence the course of the battle in which one of his divisions is engaged, the corps commander will have to use infantry support groups of an adjacent division, because, as a general rule, corps long-range artillery groups are not used for direct support missions. As far as the army commander is concerned, he can influence the course of the battle in which one of his corps participates only through a partial or general regrouping of his artillery.

Many serious changes have been introduced into the organization of the artillery since 1937. Early in the war, infantry corps were discontinued for some time and corps long-range groups were taken over by the army. And that was the beginning of *army artillery groups*. Since that time, their principal missions have been *counterbattery and interdiction fires*.

Later in the war, infantry corps were reconstituted, and with them, corps artillery groups; and today fire missions of the corps groups include the combating of enemy personnel and fire means, the destruction of concrete fortifications, and the making of passages in the obstacles. Thus, the corps commander has an artillery force at his disposal which he can use without interfering with the missions of the infantry support groups in the divisions. The corps artillery group has not replaced the army artillery. Both can function simultaneously, accomplishing different missions and complementing each other.

In assimilating the new organization, our artillerymen have had difficulties with terminology. Corps artillery groups were

often called "breakthrough," "special assignment," "general assignment," and "reinforcement" groups. All these names are confusing. It should only be remembered that the corps artillery group is an artillery force at the disposal of the corps commander, to be used for corps missions only, and for increasing the tactical density of artillery of the division requiring reinforcement.

The corp artillery, then, should have a range long enough to support the main attack of the corps and add a noticeable concentration of fire in reinforcing the artillery of one or another division.

A few disadvantages of this organization should be mentioned. Corps commanders, having realized the great advantages offered by the existence of "their own artillery," have formed several types of corps artillery groups. In addition to the main corps artillery group, there have appeared counterbattery groups, destruction groups, general support groups, guards mortar groups (a guards mortar is a rocket gun), and even corps gun groups (long rifles). These numerous groups have a tendency to disintegrate in the battle in the depth of enemy defenses and whenever the enemy manages to wedge into our dispositions.

This fad for artillery groups has not spared the army either. Here, too, the tendency to centralize everything has resulted in the formation of various artillery groups. One of the armies, for instance, had a "general assignment" group, fire missions of which were planned by the two corps commanders.

The operation of corps artillery groups confirmed in practice that commanders of units as large as divisions, corps, and armies should have special artillery groups at their disposal. This has led to the formation of *division artillery groups*. Division artillery groups were first formed in the units of the 1st and 3d Ukrainian Fronts. Other fronts soon followed.

Thus, step by step, an efficient system of artillery control has been developed in the course of this war.

Analyzing the fire missions of artillery groups in the regiment, division, and corps, we find that all groups function in the interests of the infantry. They all prepare the way for the infantry attack, repel enemy attacks in defense, neutralize enemy manpower and fire means, make passages in obstacle areas, and fight armored vehicles. Since the GHQ reserve artillery units from which artillery groups are formed possess a variety of calibers, all missions listed above can be successfully accomplished. The groups differ from each other in that they support different types of units. Thus we now have four distinct groups: regimental artillery groups (infantry support groups), division artillery groups, corps artillery groups, and army artillery groups.

There are exceptions, however. A division in the attacking echelon, for example, may be supported by the artillery of the second and third echelons, and also by 120-mm and sometimes by 82-mm mortar units. The mortars are formed into larger groups and operate only during the first two periods of the artillery participation in the attack (artillery preparation and support of infantry attack). Then the groups are discontinued and the units comprising them are returned to their respective divisions. It is not advisable to include mortar units in artillery groups. Consequently, a rifle division in attack should have two groups: one artillery group and one mortar group.

The breaching of a fortified zone cannot be accomplished without first destroying its permanent fortifications, and this calls for the employment of powerful guns and mortars. All fortifications are carefully camouflaged and interspersed with a great many dummy structures. It is advisable, therefore, to form *artillery destruction groups* out of 152-mm and 203-mm howitzers. Destruction groups should be independent corps groups. Army destruction groups are formed in exceptional cases only.

Another exception is the formation of *corps counterbattery groups*. These groups may be formed when the enemy possesses a great concentration of artillery, when the corps can be supplied with sound and flash units

and artillery aircraft, or when the corps defends on a broad front. Thus, the corps may have two artillery groups—the corps artillery group and either an artillery destruction group or a counterbattery group.

As for the army, it may have at its disposal units with long-range guns. These units should be formed into army long-range artillery groups and divided into subgroups if necessary.

Is it always necessary to form and have artillery groups? Let us take an example. Let us suppose that an infantry division is supported by several artillery units. Out of these units, the division commander has a light artillery group brigade as his "own artillery." Should this brigade be called division artillery group? Not in this case. But if the commander retains one or two howitzer regiments from this artillery brigade and one light artillery regiment of the GHQ reserve artillery, then all these units should be formed into a group, and a special commander assigned to take it over.

We can now define the artillery group. *It is two or more organic or attached artillery units (subunits) under one commander, assigned to a unit (regiment and up) for a battle or an operation.*

The War in China

Digested at the Command and General Staff School from an article by Major General E. O. Lewin in *The Army Quarterly* (Great Britain) January 1945.

FOR seven years the Chinese have resisted the overtures of the enemy and by military action have limited the scope of Japanese successes. Seriously ill-equipped, and consequently unable to train their great reserves of manpower, they have kept their flag flying where many others might have succumbed long ago. Owing regrettably to political differences, full use has not been made of the resources available; but there is still hope, now that General Chiang Kai-shek has handed over his civil responsibilities in order to devote his time to the serious military situation. It is encouraging to hear that this great leader hopes he has made satisfactory arrangements with the chiefs of the Communist Armies in the north for coordinated action against the common enemy.

Early in November 1944 the Japanese advance down the Peiping-Hankow railway brought them to Liuchow (see sketch), where the United States 14th Air Force base had been established and from which the Japanese coastal traffic to the South China Sea had been so heavily harassed. Our Allies were forced to blow up their airfields and retire farther from the coast. In some measure the increase in the strength of the Superfortresses with their wide range compensated for this loss, but the enemy are now within measurable distance in time and space of establishing their through communication by rail to Indo-China and also to Thailand and Malaya. It will be some time before a working line will be available as the damage to the track is said to be heavy, and for long distances none has ever been laid down, although the foundations have been built.

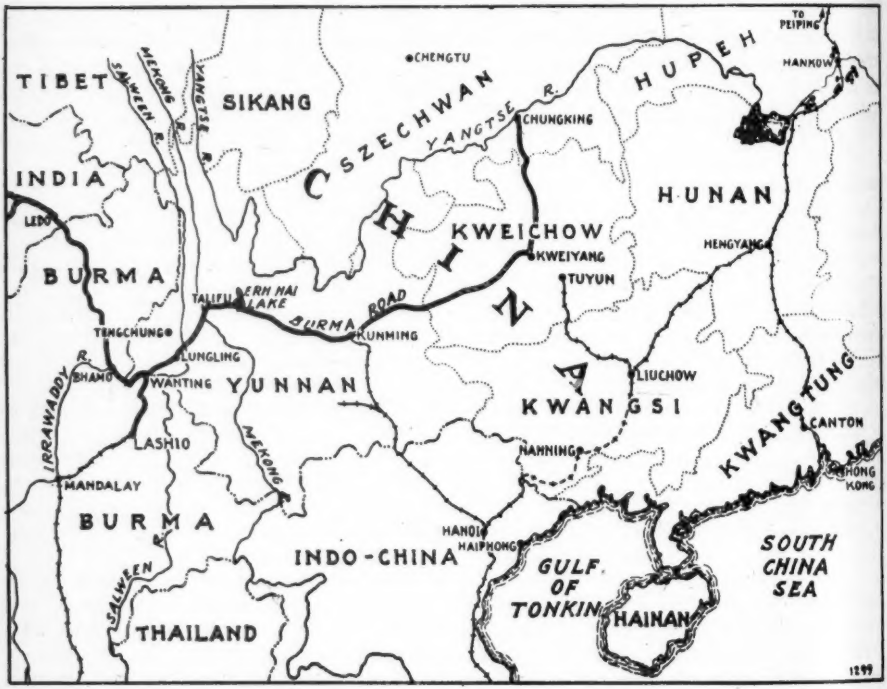
This success has, however, opened the way for the enemy to objectives of greater strategical importance even than a north-to-south through railway.

It appeared probable that the Japanese would move westwards from the railway as well as directly towards the Indo-Chinese frontier. This move is now in progress. From Liuchow a branch line runs northwest as far as Tuyun, and from there a road leads to Kweiyang farther to the northwest. This place is the capital of the province of Kweichow; but its importance lies in its position on the Burma Road and as a key point on the road from Kunming to Chungking, over which the bulk of the supplies flown into China from India for the Chinese armies

has passed. These operations are thus linking up strategically with those in Burma.

The road into China from Lashio and that from Ledo via Bhamo meet near Wanting. From Wanting to Kweiyang is about 520 miles, and Kunming lies about half way between the two. If the enemy capture Kweiyang, road traffic from Kunming to Chungking will have to move north over the Yangtse via Chengtu. This route is some 630 miles from Kunming to Chungking, 150 miles longer than via Kweiyang. Once established in the latter place, the way is open to the enemy to move either north on Chungking (210 miles) or west on Kunming (270 miles). If they choose the former, we may well see other columns moving west from the Peiping-Hankow railway from road centers to the north of Hengyang. If they choose the latter, we may expect to see Japanese columns moving up the railway from the direction of Hanoi in Indo-China towards Kunming. We know that the enemy are advancing from Liuchow on Nanning, which lies on the road to Hanoi, and although this is part of their plan to open through north-to-south rail communication, it fits in well with a plan to counter our successes in Burma.

The distances given in rough terms above can be more easily grasped if we note that from the railhead at Ledo to Wanting via Bhamo is 360 miles. Heavy road-making operations had to be undertaken in North Burma, whereas the Chungking-Kunming circuit has been in use for some time. From every point of view the enemy have an easier task before them in southeast China than we have in Burma, more particularly in view of the inadequacy in arms and, consequently, training of the Chinese armies. In general, the strategical situation seems to have



been well appreciated by the Japanese, and it looks as if they are going to try to close the eastern end of the Burma road just as we are well on the way to opening the western end.

It will be suitable now to examine the situation in Burma and on its eastern frontier. In August the Chinese army operating from the province of Yunnan towards the left flank of our forces moving south on Bhamo was reported to be in Tengchung and Lungling through which latter place the Burma road runs. It was anticipated that the two Allied forces would establish firm contact, but up to date the only report to hand on this point is that a long-distance patrol from the west has reached the Chinese army coming from the east. That more rapid progress has not been made may be due to lack of arms and munitions, to poor communications, or possibly to the fact that the Chinese forces which crossed the Salween River are operating under orders from Chungking and not from the SEA [Southeastern Asia] Command; coordination may not be easy.

In view of the Japanese progress towards Kweiyang and their possible move westwards along the Burma road, it will be as well to note the position of the Chinese force at Lungling from the point of view of a threat from the direction of Kunming. Lungling is 160 miles from Talifu which lies on the great lake Erh Hai; thence to Kunming is about 200 miles. Now the Chinese forces in Yunnan must be relying on the road from Chungking via Chengtu to Kunming for supplies of all natures, and hence from their point of view alone the importance of the latter place must be very great. From the wider strategical aspect this place grows in importance, particularly if the strategy in the Far East should be based on the establishment of an Allied chord from Burma to the southeast coast of China, thus cutting off the Dutch East Indies and other occupied territory south of this chord from contact with the enemy's northern bases. Hanoi and Haiphong in north Indo-China should be included in this chord, and hence again is stressed the importance of Kunming with its rail communication south to the Gulf of Tonkin on the Indo-Chinese northeast coast. Allied strategy for the Far East is of course laid down after consultations at the various world meeting places of our leaders, but the grand-tactical moves called for by the ever-changing situations may well before long make the presence of a supreme commander for the whole Asiatic theater essential.

Motorized Infantry in Offensive Operations

Translated and digested at the Command and General Staff School from a Russian article by Lieutenant Colonel P. Slesarev in *Krasnaia Zvezda* (Red Star) 31 August 1944.

IN pursuit, tanks often move far ahead of the infantry, leaving the latter two or three days behind. To avoid this, tanks should be escorted by highly mobile motorized infantry units. Motorized infantry considerably increases the breaching power of the tanks and enables them to maneuver not only frontally but also along the axis of the attack.

The tactics of the motorized infantry vary depending upon the progress of the operation. Right after the breakthrough is effected, the motorized infantry operates with foot infantry and artillery. Later, however, when the foot infantry and artillery units begin to lag behind the tanks, the advance of the motorized infantry acquires great mobility. During this stage, it engages in swift maneuvering, replacing foot infantry and artillery units.

What, then, are the standard methods of using motorized infantry in an offensive operation? The analysis of an example will help us answer this question.

In one of the sectors of the front, a strongly fortified German position was breached, and our tanks and a motorized infantry unit soon reached a highway. When they had approached a well-fortified village, they were met by strong German artillery and mortar fire. An attempt to take this formidable center of resistance from the march proved unsuccessful. A thorough reconnaissance established that, in the outskirts of the village and along the western bank of the river Drut, in a zone five or six kilometers wide, there were about a regiment of infantry, six "Panthers," four "Tigers," and a battalion of field artillery. It would be extremely difficult to pierce such a defense by a frontal tank blow, while a turning maneuver requiring the crossing of the river would take too much time and the enemy, noticing our preparations for the crossing, could quickly bring his heavy tanks to the threatened sector.

It became obvious that the destruction of the German center of resistance was impossible without the participation of the motorized infantry, and the following plan was adopted. The tanks and the self-propelled artillery were to engage the fire means of the enemy by feinting a frontal attack. Meanwhile, the motorized infantry, dismounted, was to envelope both enemy flanks. For this purpose, one of our motorized infantry battalions was split into two groups. One group was reinforced by a battery of regimental artillery, while the other group was given mortars, a machine-gun company, and an antitank-rifle company.

Since the main attack was to be made by the motorized infantry and inasmuch as this was to be preceded by the feint, the tanks opened fire first. Approximately half an hour later, when the whole German artillery and tanks had been involved in the fire fight, our infantry quickly began enveloping the flanks of the enemy position. To frustrate this maneuver, the Germans committed their bomber aviation, but the swift appearance of our fighters and Stormoviks neutralized all its efforts. The assault groups of our motorized infantry, supported by aircraft, forced the river north and south of the village and approached the highway. Trying to hold on to their only line of retreat, the Germans sent several heavy tanks against our motorized infantry. But this failed too. The antitank weapons with which the motorized infantry was so thoughtfully provided enabled it to repel the enemy tanks.

Soon the highway was taken under the crossfire of our artillery and machine guns. The distance between the two attacking groups of our motorized infantry was reduced to one and a half or two kilometers. The Germans were threatened with encirclement and forced to start withdrawing hastily along the highway. At that moment our tanks, by a sudden frontal assault, broke through the village and attacked the Germans. Within a short time, 300 Germans were killed and three tanks destroyed. Our troops captured 200 prisoners, eight guns of various calibers, machine guns, and mortars.

In this example, the success was due to the correct employment of motorized infantry. Its assault groups did not support the tanks, as is generally the case, but made the main attack. During the first stage of the engagement the tanks played a secondary part, and only later, when they had broken through the village, did they use their high mobility and striking power to their full extent. It should also be noted that the maneuver of the motorized infantry could perhaps have been unsuccessful if it had not had sufficient artillery to repel probable tank counterattacks. Consequently, whenever motorized infantry attacks independently, it should be reinforced by antitank weapons. It should be kept in mind, however, that too much artillery affects the mobility of the motorized infantry, and that it is this mobility that is decisive in envelopment or turning maneuvers. Support given by air is also very important. Attack planes should support the motorized infantry throughout the entire operation. This steps up the tempo of advance and increases the stability of the motorized infantry in repelling tank attacks. With the help of attack planes, our motorized

infantrymen have succeeded many a time in repelling counterattacks of German tanks, and not infrequently tank counterattacks were prevented by the destruction of enemy tanks in their positions of departure.

The following example illustrates a different form of employment of motorized infantry. Pursuing the retreating enemy, our tanks and motorized units reached a river defended by approximately a battalion of enemy infantry, several tanks, and seven self-propelled guns of the "Artsturm" type. The motorized infantry unit attacked under the cover of darkness and crossed the river. Twelve field pieces were ferried across the river on rafts. Without waiting for the tanks, the infantrymen closed in on an important highway and again threatened the Germans with encirclement. The Germans withdrew. The enemy group was pursued for about eight kilometers and suffered losses in personnel and equipment. At dawn our tanks and self-propelled guns joined the motorized infantry.

The above engagement is characterized by rapidity and boldness of maneuver. Hence the conclusion: when motorized infantry gets ahead of its tanks, it should not limit itself to routing the enemy on his first line of defense. Bold and uninterrupted pursuit will inflict heavier losses on the enemy and wear him out completely. Rivers will delay tanks for a long time, but this should not slow down the infantry. By skilful attacks and short defensive pauses, the infantrymen help the tanks in crossing operations and in their preparation for a new thrust.

The motorized infantry plays a particularly important role in joint operations with tanks in wooded and swampy terrain. It may be stated that, without the motorized infantry, the rate of advance of tank units would be very slow. The motorized infantry marches with sapper units ahead of the tanks, clears roads and paths of mines, and removes the abatis frequently used by the enemy.

The above examples will help us draw some general conclusions with respect to battle formations of motorized infantry. It is obvious that when pursuit is conducted at a rapid tempo and by tanks only, the motorized infantry forms the second (reserve) echelon of the advance force. It moves in trucks within approximately thirty to forty minutes of the tanks. Experience shows that this time distance is best. The commander of the motorized infantry unit, upon receipt of a battle order, will have enough time to estimate the situation and to make his decision before meeting the enemy.

In attacking hastily fortified positions on terrain favorable for tanks, the tanks again form the first echelon. The motorized infantry should follow the tanks at a distance of 150 to 200 meters. In areas hardly accessible for tanks (water courses, marshy or mountainous terrain), neither the tanks nor the infantry can be employed in frontal attacks because of possible heavy losses. A bold envelopment, therefore, is then the method to be used. But which arm is to execute the maneuver? This depends on the terrain. As a general rule, envelopment is ideal for tanks. Only when the flanks are inaccessible for tanks should the maneuver be executed by the motorized infantry.

It is up to the senior commander to decide in each particular case which of the two methods will be the most effective.

Thus, the motorized infantry employs three methods of advance: following the tanks, on the flanks of the tanks, and ahead of them. With a continuous air support, the skilful use of these three methods will enable the tanks and the motorized infantry to solve complicated tactical problems even under conditions of long isolation from our infantry and artillery units.

Fighting the Secret Weapons—Electric Mines

Digested at the Command and General Staff School from *His Majesty's Minesweepers*, a booklet prepared for the British Admiralty by the Ministry of Information.

THE first ship to be mined in the present war was the British steamer *Magdepur*, which blew up and sank off the east coast on 10 September 1939. Six days later the *City of Paris* struck a mine but escaped with little damage. As the weeks passed, losses became more serious, and statements made by a prisoner of war revealed that the enemy was discharging magnetic mines from submarines. This evidence appeared to be confirmed by a number of unexplained explosions and sinkings off the coast.

Hitler had boasted of his "secret weapon" and it seemed that this might be the magnetic mine. It was not, however, a new invention, for the Royal Navy had used magnetic mines off the Belgian coast during the previous war, and, so far from its being a secret, an American citizen, Mr. Caesar Marshall, had been granted a British patent for such a device in 1918. Other inventors had experimented with mines of similar type, and the Mine Experimental Department of HMS *Vernon* (a naval shore establishment, not a ship) was well aware of their existence; indeed, its own magnetic mines were in an advanced state of development.

The magnetic mine is so called not because it is attracted to a ship's hull but because it is detonated by a magnetic needle which becomes active when a large mass of iron passes into its field. When the mine is laid on the sea bottom it can operate only in comparatively shallow water, but within its range it can cause far more damage than the moored mine, since the moored mine blows a hole in a ship, usually for'ard, which may be localized, whereas the explosion from a ground mine strikes the vessel under her bottom amidships, opening up the plating of the hull, shattering the machinery and the pipes, and frequently breaking her back.

Against this weapon neither the existing sweeps nor the paravane availed. But countermeasures were taken, first with the "Bo'sun's Nightmare," which was still in the experimental stage. This was a wire sweep to which a number of magnetized bars were attached and towed between two ships just off the sea bottom. Large electro-magnets and barges with coils of wire were also used; even aircraft were employed. The first magnetic mine was detonated in the Bristol Channel, but although the sweepers were rapidly fitted with new devices and the officers given instruction in their use, none was wholly satisfactory and the sinkings continued at an alarming rate.

A doctor cannot prescribe a remedy until he has had the opportunity of diagnosing the disease, and the officers of the Mine Experimental Department of HMS *Vernon* could not find the effective antidote to the magnetic mine until they had studied a specimen and discovered its mechanism. Every effort was made to recover a magnetic mine intact, but for some time without success.

Then it appeared that the enemy was dropping the mines from aircraft. This was all the more serious, because it rendered our own mine barrages, which were a protection against surface-layers and submarines, of no avail.

The danger to shipping had suddenly become intensified, and it seemed that merchant traffic would be paralyzed unless the remedy could be found. The men in the sweepers did all they could, but they were powerless against this weapon new to their experience. They looked to the scientists to give them the means to combat the offensive, but that the scientists could not do until they had discovered exactly what they had to fight.

The first definite evidence that the enemy mines were being laid from the air came on the night of 21 November, when aircraft, believed to be Heinkel 115's, operating from bases on the islands of Sylt and Borkum, were seen to drop mines in the Humber and in the estuaries of the Stour and the Thames. Ob-

servers reported that the mines looked like sailors' kit-bags suspended from parachutes.

At ten o'clock, 22 November, sentries at Shoeburyness, on the Thames Estuary, saw a German aircraft drop an object into the sea near the beach. At first they believed the

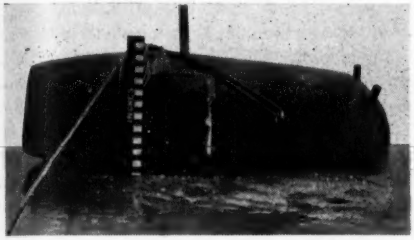


FIGURE 1.
FIRST GERMAN MAGNETIC MINE TO BE DISCOVERED INTACT, 23 NOVEMBER 1939.

dark shape to be a parachutist. A report was made to the naval authorities, who realized that the chance of recovering a magnetic mine intact had come at last.

A special party set off in the darkness, splashing through the pools left by the ebbing tide. At length the light of the torches revealed a black object lying partially embedded in the sand (see Figure 1).

They found the mine to be cylindrical in shape, about seven feet long, made of some aluminum alloy, with tubular spokes on the nose and a hollow tail containing a massive bronze spring for projecting the parachute. There were two sinister fittings near the fore end. One was evidently a hydrostatic valve. The other was impossible to identify. It was made of polished aluminum and secured by a screwed ring sealed with black wax. Its total weight was 1,128 pounds and it carried an explosive charge of 660 pounds in the fore end. The conical stern became detached when the aircraft dropped the mine, thereby releasing the parachute. Mr. Churchill had given orders that work was to proceed night and day until the answer had been produced. In twelve hours the solution was passed to the Admiralty: it was indeed a magnetic mine, and all its secrets had been laid bare.

The recovery of these mines was a turning point in the long and bitter conflict between minesweeper and minelayer. Hitler had relied on the magnetic mine to destroy the British mercantile marine. It is on record that Captain Hans Langsdorf, of the *Graf Spee*, assured his prisoner, Captain Patrick Dove, master of SS *Africa Shell*, that Germany regarded it as the secret weapon which would be the decisive factor in winning the war. He declared that it had been invented eight years previously and that since then the cleverest German technicians had failed to find the antidote.

But what one man's brain can contrive, another's can resolve. There is a parry to every thrust, an antidote to every poison, once the analysis has been made, and as soon as the secrets of the magnetic mine had been discovered it was possible to provide the countermeasures.

A new sweep was evolved, the principle being to create a magnetic field which would activate the needle of the mine, and the sweepers soon began to achieve satisfactory results. Moreover, since the paravane could give ships no protection against ground mines, they were provided with a simple but

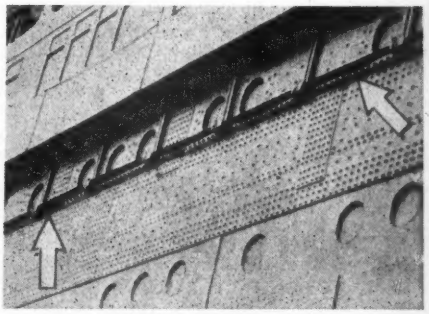


FIGURE 2.
"DEGAUSSING GIRDLE" AROUND THE LINER "QUEEN ELIZABETH."

effective device known as a "degaussing girdle," which could be fitted to vessels of any size: a band of wire fastened round the hull, level with the upper deck and energized by an electric current, which has the effect

of neutralizing the ship's magnetism and giving her almost complete immunity (see Figure 2). At one time, 1,200 miles of wire cable were being used weekly to fit the ships.

It was this degaussing gear which made it possible to send RMS *Queen Elizabeth* on her maiden voyage to New York, and it has saved countless other vessels, great and small, from destruction.

Once these remedies had been found, the losses were far less disastrous. The sweepers, however, were faced with a resourceful and remorseless enemy, who knew how to vary his tricks and was deterred by no considerations of chivalry in his designs for paralyzing British commerce.

The German occupation of Norway, Denmark, Holland, Belgium, and France, and Italy's entry into the war, placed an even heavier burden on the sweepers. A new phase of mine-warfare began: the laying of contact mines by E-boats after a preliminary aircraft attack on the sweepers. In these offensives the sweepers gave a good account of themselves, although there were inevitable casualties.

The Admiralty's answer to this campaign was sweeping by night. This was unknown in the last war and it presented a complex problem, particularly in the tidal channels of the Thames Estuary. But it was mastered.

The result of the sweeping during the first twelve months of the war was an achievement of which the little ships could be proud, but for them there was no resting on their sweeps. From day to day there was no knowing what fresh "secret weapon" would confront them. None knew better than they that across the water the best brains in Germany were devising new engines of destruction, one of which at any moment they might have to meet.

In due course it came. Observers began to notice that minelaying aircraft would cut off their engines before releasing their mines. There were reports of more unexplained explosions, some of them in water which had been swept for ground and contact mines. The new type was found to be actuated by the underwater sound emitted by the passage of ships through the water. This became known as the acoustic mine. Once again the experts of HMS *Vernon* tackled the problem and took measures—which of necessity must remain secret—to counter the new campaign.

While the Germans continue to produce their "ingenious variations," as Mr. Churchill has called them, the men of the *Vernon* continue to lay their counterplans, deducing from their experience what the next trap may be, so that they may be ready when it comes and, if possible, at least one jump ahead in their precarious work of finding the right equipment to place in the hands of those whose duty it is to sweep the sea.

Heavy Self-Propelled Guns in Tank Battles

Translated at the Command and General Staff School from a Russian article by Lieutenant Colonel G. Khainatskii in *Krasnaia Zvezda* (Red Star) 17 November 1944.

Two peculiarities are noticeable in the present tank-versus-tank engagement, neither of which existed in tank battles at the beginning of the war. The first peculiarity is that a tank-versus-tank collision is now essentially a fire fight rather than a battle of maneuver. All firing is done at maximum ranges, which may be as far as two kilometers. The very first shots stop the enemy's maneuver, while a strong fire forces the tanks to take cover. The increase in the range and in the caliber of the tank gun has changed our battle tactics considerably. A maneuver the purpose of which is to disengage from the enemy is dangerous, because it is risky to expose the rear and sides of the vehicles. For this reason, the fire power of the gun and the thickness of the front plate have become the fundamental factors determining the outcome of the battle.

The second peculiarity is the use in tank formations of self-propelled artillery. A

study of the evolution of this weapon also reveals a trend toward a greater range and fire power. There has been a continuous increase in the caliber of the self-propelled gun and in the thickness of its armor, and the very appearance of self-propelled guns in battle formations of tanks shows the tendency to increase the fire power of the armored formation as much as possible, even at the expense of its maneuverability as a whole (self-propelled guns are less maneuverable than tanks but are superior to them in fire power).

There are two reasons why the self-propelled artillery is used in tank formations: first, to free the tanks from the necessity of dueling with antitank guns, tanks, and self-propelled guns of the enemy; and second, to enable the tanks to maneuver on the battlefield under favorable conditions. In this regard, the self-propelled artillery may be compared to a shield protecting the tank maneuver.

In engagements with enemy infantry and artillery, self-propelled guns move behind the tanks or on their flanks and destroy the targets threatening the tanks. All types and calibers of self-propelled guns are used for this purpose. The situation changes, however, if the enemy manages to commit his antitank reserve composed mainly of Mark V and Mark VI tanks and "Ferdinand" self-propelled guns. This reserve strives to engage our tanks in open terrain. Opening direct fire from a distance of about two kilometers, the "Tigers" and "Ferdinands" try to arrest the maneuver of our tanks and to divert them from the accomplishment of their main mission, which is the destruction of enemy manpower. And it is at this stage that our heavy self-propelled artillery is called upon to play a decisive part. Its appearance on the battlefield upsets German plans which are based on the superiority of their long-range fire.

Successful employment of heavy self-propelled artillery in tank battles depends on the commander's ability to evolve tactical methods and forms of cooperation with the tanks which will secure the element of surprise by maneuver and fire. The greater the element of surprise, the better the chances of success and the wider the possibilities of maneuvering under the protection of self-propelled artillery.

We should not forget the importance of the time element in committing the self-propelled artillery to battle. Its premature commitment takes away the element of surprise and results in spending ammunition in firing on less important objectives, which is very undesirable. However, its commitment should not be delayed until the last moment, when only a few minutes remain before contact with enemy tanks is established.

More often than not, self-propelled artillery is kept in the mobile reserve of the commander of the tank unit. It may be brought closer to the tanks, however, when the direction of a hostile tank counterattack is known. Ordinarily, it marches from 300 to 700 meters behind the second echelon, moving from cover to cover.

The arrival of the heavy self-propelled guns should be timed so that the tank and gun crews will have enough time to establish proper cooperation. This can be done while the guns are moving toward the battlefield. A staff officer (tank troops) with the situation map is sent to meet them. He explains the mission to the artillerymen, works out with them a table of signals for cooperation, and leads the guns personally to their area of departure.

If time is available, a joint reconnaissance or simply a meeting of the officers of the cooperating units is organized. Such personal contact helps a lot. But if the tank battle has already started, the commander of the self-propelled artillery sees to it that his crews know their mission and the mission of the supported tanks. All missions are indicated on the ground. Each man memorizes the mission and the table of signals for cooperation. This is done because in battle the guns are dispersed, and correct selection of targets depends largely on how well the men understand the maneuvers of the tanks.

A tank battle requires simplicity of maneuver. It is difficult to control a complex maneuver and there is little time for it. This applies also to the self-propelled artillery. It is important that its cooperation with the tanks should also assume simple forms. Despite their seeming variety, maneuvers of self-propelled artillery may be reduced to two basic forms. The first is the advance of self-propelled guns from behind their tanks to encounter the enemy tanks; the second, an ambush on the route of advance of the enemy tanks. The terrain and the situation determine which of these methods to use. The purpose of both methods is to enable the self-propelled artillery to disrupt the maneuver of enemy tanks by its fire and to neutralize the enemy's tank fires by engaging his most active vehicles, i.e., heavy tanks and heavy self-propelled guns.

When the battle begins, the tankmen inform the self-propelled artillery by means of signals (or by radio) about the number of enemy tanks, the direction of their movement, and of the impending maneuver of our tanks. As soon as the self-propelled guns open fire, the tanks may take positions behind them. Then our tankmen either bypass the enemy tanks or strike at them from the flank, destroy them, and then continue their advance. The latter method is usually preferred because there is always a danger of repeated counterattacks before the enemy tanks are destroyed.

In a tank battle, it is very important to dispose the self-propelled artillery in such a manner as to enable the tanks to have sufficient room behind their firing positions so that they may deploy for maneuver. It is best to locate their firing positions along the edge of woods or in the outskirts of populated places; both offer good concealment for tanks. Self-propelled batteries should be disposed so that they can parry turning maneuvers by the enemy. They should be echeloned in depth, and possibilities of mutual protection and of firing concentrations on roads and other areas accessible for tanks should be considered. One battery should always remain in the reserve of the unit commander. Fire on enemy tanks is opened immediately after the positions have been occupied. All the guns, including those of the reserve, participate in the first barrage. They continue firing until our tanks have taken cover. Then one or two batteries keep on firing while the remaining guns displace forward or go into ambushes.

Enemy tank attacks are beaten off by the fire of the forward batteries. Enemy tanks attempting to outflank us are usually taken care of by the reserve battery. After it has succeeded in stopping the enemy, the remaining batteries turn his flanks and take his vehicles under fire at long ranges. The enemy's attempt to employ part of his vehicles as a screen and to use his main forces to pursue our withdrawing tanks should be prevented by active operations of the self-propelled artillery.

Self-propelled guns may remain in their firing positions until our tanks have accomplished their mission. They immobilize the enemy tanks and prevent them from disengaging from battle, thereby accomplishing their main mission which is securing liberty of movement for our tanks.

Fighters Behind Jap Lines in Burma

Digested at the Command and General Staff School from an article by Brigadier General H. S. Sewell in *Britain* (British Information Services) March 1945.

DURING the three years their country has been in enemy occupation, the Burmese of the cities and plains have not been able to offer any effective resistance to the Japanese. Cut off from outside help, their position has been similar to that of the inhabitants of the Dutch East Indies, Indo-China, and the Philippines. But in those parts of Burma which the Japanese have not been able to bring fully under control—in the wild moun-

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tain country of the far north and in the hill districts on the Indian frontier—Burmese tribesmen have been fighting in the defense of their homes and have been carrying out distant operations behind the enemy's lines ever since the Japanese invaded Burma.

In the Chin Hills, near the Indian frontier, volunteers for service in the army have been formed into a Chin Hills battalion of the Burma Frontier Force. Others are serving with a formation known as the Chin Levies and have waged a stealthy, scattered, hide-and-seek campaign, which has cost the Japanese many casualties. Some of the fighters are old soldiers of the Burma forces and some are tribesmen from enemy-occupied villages. British officers, many of them ex-civil servants, direct the broad lines of strategy, but usually the Chins operate by themselves in small bands.

Though, in the opinion of officers who have fought through the campaigns in Burma, Japanese troops cannot be dealt with effectively by irregular fighters alone, the assistance which the Chins have given to the regular British, Indian, Gurkha, and African troops of the Fourteenth Army has been invaluable. They have been particularly successful in harrying enemy communications and ambushing reinforcements. Even more important is the information they supply about Japanese movements.

In proportion to their numbers the Chin Levies have killed more Japanese than have been accounted for by regular troops, in the area where they have been fighting. Most of the men of the Levies wear Kurkha hats and all wear army shorts. Nothing else about them can be identified as uniform. By way of decoration, every Chin who has killed a Jap wears a small patch of red cloth attached to his shirt by a safety pin.

The Lushai Hills, just north of the Chin's country, are actually on the Indian side of the frontier. Lushais and Chins, though in many ways similar, have been enemies for centuries; but they are united at last as brothers-in-arms against a common enemy. Lushai volunteers have been organized in a brigade, officered largely by civil servants from Burma. This force fought with very great distinction near Fort White, and is now operating with the advance guard of the Fourteenth Army on the Myitta, a tributary of the Chindwin.

The Naga Hill tribes, the most primitive and wildest of the border people, are among Britain's staunchest allies in Burma. Their country, 200 miles northeast of the Lushai Hills, is a jumbled mass of forest-covered ridges with peaks rising to ten thousand feet. Last spring, when the Japanese crossed the Indian frontier, some of the hardest fighting took place in the Naga Hills. The Japanese tried to win over the tribes. Naga interpreters, government officials, and policemen would have been invaluable to the Japanese intelligence. But the hill people were not influenced and continued to work for the British, even with the Japanese in their villages. They excel as scouts, and, working among the Japanese, were able to gather priceless information for the British staffs. Many wounded Allied soldiers and airmen owe their lives to the Nagas, who carried them in for great distances on improvised stretchers, through Japanese-held country, sometimes fighting off enemy patrols to bring these men in.

The most northerly part of Burma is inhabited by the Kachins, a sturdy Mongoloid hill tribe numbering about half a million. Unknown to the outside world before the war, they have become famous through the exploits of the Northern Kachin Levies and the Kachin Rangers.

The Northern Kachin Levies were formed in Fort Hertz, 200 miles north of Myitkyina, in an area never reached by the Japanese. During the Allied advance on Myitkyina, the Northern Kachin Levies protected the left flank of General Stilwell's American-Chinese force. The Levies claim to have killed 1,500 Japanese, 300 of whom were from the enemy forces trying to escape from Myitkyina. Of the seventeen senior officers with the Northern Levies, eight are British, two Anglo-Burman, seven Kachin and Karens. The junior officers are all Kachin. Many of the Kachins served formerly in the Burma Rifles

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and the Burma Frontier Force. All the officers speak Kachin and most of them lived formerly in Burma.

The Kachin Rangers were raised after the Northern Levies. Starting from a small band of guerrillas, they have grown in two years into a larger force than the Levies. Composed entirely of Kachins and officered by American Army, Navy, and Marine personnel, the main task of the Rangers has been long-range penetration. This force accompanied and preceded General Stilwell's advance on Myitkyina and since then has continued its operations deep into Burma. The Kachin Rangers have killed 3,000 Japanese, nearly all in ambushes and skirmishes, have taken and flown out thirty-five Japanese prisoners, and have rescued 220 Allied airmen forced down in the jungle, including many Air Transport Command pilots flying the "hump" into China.

The Kachins are armed with all modern automatic weapons, and in the field are maintained almost entirely by supplies dropped from the air. Both American officers and Kachins have often been dropped from the air. Many Americans speak Kachin, while others rely on interpreters.

The staunch and enthusiastic support of the hill people of Burma for the Allied cause says a great deal for the devoted work of generations of British officers in this remote country, who have created a deep mutual affection between themselves and those whom they have served. The hillsmen are simple people who cannot be expected to grasp the profounder implications of Axis aims, and powerful inducements to betray have been offered to them by the Japanese. These inducements have been scorned, and the Allied cause has been immensely aided by these hardy people from the Burma hills. They will have played their part in the final victory.

Stormovik and Torpedo Bomber Groups

Translated at the Command and General Staff School from a Russian article by Captain A. Kryzhanovskii in *Krasnyi Flot* (Red Fleet) 5 October 1944.

In attacks on convoys, simultaneous action from different directions reduces to the minimum the effectiveness of antiaircraft fire of the convoy, hampers the maneuvering of the transports and escort ships, and makes swerving to avoid dropped torpedoes almost impossible.

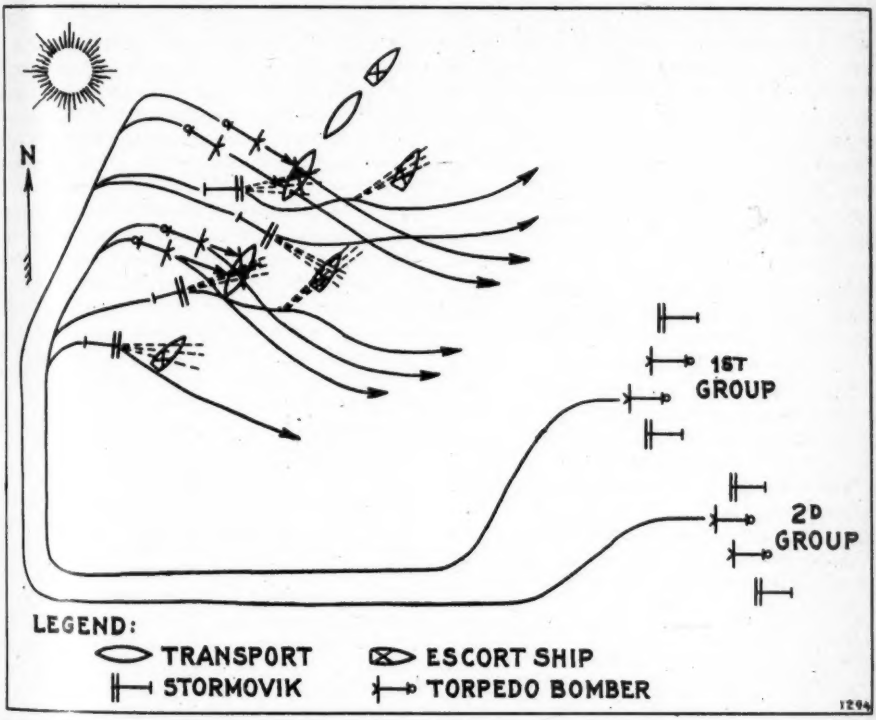
Group attacks conducted by Stormoviks and torpedo bombers are usually employed against targets which have been reconnoitered in advance, that is, when the data concerning the location of the convoy, its course, speed, composition, and sailing order, and weather conditions en route and in the target area are known before the start. These data help to determine in advance the best tactical methods to be used in the attack, and they are also useful in working out a new plan of action should the situation change.

Experience shows that variety in the method of attack is the most important condition for a successful group attack. The task of the commander organizing the attack is to stun the enemy by new tactics, to prevent him from figuring out our intentions, and to be ready for his countermeasures.

Let us analyze an example of a successful attack carried out by our torpedo bombers on a German convoy in the Baltic. The convoy was composed of three transports and four escort ships (see sketch). A reconnaissance plane had reported by radio all the necessary data. It was decided to attack in two groups. Each group was to consist of two torpedo bombers and two Stormoviks. Ten fighters were detailed for their protection.

Before the flight, the crews studied the plan of the attack worked out by the staff, and memorized all its details. Since the convoy had four warships, strong antiaircraft fire was expected. The plan of the attack, therefore, was as follows: the Stor-

moviks of each group would attack first and neutralize, by means of machine-gun and cannon fire, the antiaircraft weapons of the transport to be attacked and of the escort ship nearest to it. This would enable the torpedo bombers to approach the target transports were moving northeast in a single line, and at a distance of from 300 to 400 meters from each other. The escort ships were disposed as follows: one at the head of the convoy, one closing the column, and two on the starboard side. Such a disposition



to a distance of an effective torpedo attack. The distance between the Stormoviks and torpedo bombers at the start of the attack was to be from 1,000 to 1,500 meters. The two largest transports were supposed to be attacked simultaneously by both groups. The first group was to attack the last transport; the second, the middle one. Situation permitting, the planes would attack from the northwest, from the direction of the sun. The sun would be low over the horizon at the time of the attack.

The convoy was soon discovered. The of escort ships indicated that the enemy anticipated attacks from the east.

Considering the disposition of the escort ships, the commander of the first group decided to attack from the port side, or from the direction of the sun. In order to get to the approach position, the group went around and south of the convoy (see sketch) at an altitude of 200 meters and at a distance of twelve to fifteen kilometers from the enemy. This was sufficient since the haze in the target area limited the visibility to ten kilometers.

Having approached the target to within six or eight kilometers, the commander of the first group ordered the Stormoviks to attack. The two Stormoviks, now flying at top speed, took the tail transport and the two nearest escort ships under machine-gun and cannon fire from a grazing flight. The transports and warships opened strong fire on the Stormoviks. It had little effect, however, since the attack from the direction of the sun made it difficult for the enemy to conduct direct fire.

Following the Stormoviks by ten or twelve seconds, both torpedo bombers attacked the transport simultaneously. Without encountering serious antiaircraft resistance, they dropped their torpedoes at close range. The transport began turning to the left, but it was too late. One of the torpedoes hit the stern. The 8,000-ton transport sank within five minutes.

The leader of the second group also attacked from the direction of the sun. This group arrived at the target area in two minutes after the first group and attacked the middle transport. Under the protection of the Stormoviks, both torpedo bombers attacked within two or three seconds of each other. One of the torpedoes hit the central part of the ship. The transport, displacing 10,000 tons, careened to the left, turned over in a few minutes, and sank.

The second group had to overcome a stronger resistance. In addition to his antiaircraft fire, the enemy committed his escort planes. But our fighters had engaged them even before they reached the target area. To observe the result of their attack, the group remained in the target area for seven minutes. Seeing that the transport had been destroyed, the planes returned safely to their base.

This group attack proved effective because its preparation was based upon precise and detailed aerial reconnaissance data. The method of the attack was carefully worked out in advance, and each crew knew before the start its part in the general plan of attack. The crews operated boldly, with determination, and in strict compliance with the plan. The leaders had made a correct estimate of the situation and had attacked the enemy from the direction where an attack was least expected.

Experience shows that in group attacks strict compliance of each crew with the sequence of operations decided upon in advance is of particular importance. The violation of a single element of the plan, particularly in the initial stage of the attack, may cause the attack to assume an unorganized character and lower the effectiveness of the blow. A change in the plan of the attack may be tolerated only if the situation in the target area has distinctly changed, and when the success of the attack requires a new method of action. Having made another decision, the group leader should communicate it to his subordinates by radio, explain his new plan of action, and give clear commands.

The above method of cooperation between Stormoviks and torpedo bombers should not be used in all cases. It should change depending on the situation. Experience shows, however, that a preliminary blow by Stormoviks, possessing an enormous machine-gun and cannon fire power, paralyzes the antiaircraft means of the convoy ships and enables the torpedo bombers to approach the target for an effective assault.

The cooperation between the groups should be organized so as to inflict the blow simultaneously and, if possible, from several directions. This disperses the antiaircraft fire of the convoy and handicaps the ships in their maneuvering for evasion. The attack from the direction of the sun in morning and evening hours lowers the effectiveness of the antiaircraft fire of the ships.

New Developments in Submarine Warfare

Digested at the Command and General Staff School from an article in *The Times* (London) 8 February 1945.

THE high tide of the U-boat success was reached in 1942 and the early months of 1943. Up to May 1943, no substantial development had taken place in the design or construction of U-boats; the U-boat of that day was to all intents and purposes the same—normal engineering and shipbuilding progress expected—as the U-boat of 1918; its success had proved so great that there had been no compelling impulse to improve it. That success was achieved partly through large numbers and partly by the development of new methods—the "wolf-pack" tactics and the night attack on the surface—whereby the British shortage of escort craft could be exploited to the full.

Once the shortage was overtaken in May 1943, however, the sea and air escorts gained the upper hand of the U-boats and succeeded in destroying them faster than the enemy could build them; and it then became clear either that all German hope of victory through U-boats must be abandoned or else that the U-boat itself must be so improved and developed that it would acquire new powers. The German expert, faced with the task of producing an improved U-boat, would naturally look first at the shortcomings and handicaps under which the existing U-boats labored and which had led to their defeat, and would set to work to eliminate them.

The chief weaknesses of the pre-1945 submarines have been two: they have been compelled to come to the surface for an hour or two in every twenty-four for the purpose of replenishing the air in the boat and of recharging the electric batteries on which they rely for propulsion when submerged; and their speed and endurance under water have been strictly limited. It is when on the surface that the submarine is liable to detection by aircraft, by the eye or by radar, and that liability has proved one of its most fatal weaknesses. A very large proportion of U-boat losses have been incurred during passage between their bases and their hunting ground at sea, which had to be made on the surface because their diving endurance was limited. It was their practice at first to make the greater part of the passage at high speed on the surface at night in order to gain plenty of sea room by daylight. But the development of radar, and of the "Leigh searchlight" carried by aircraft, largely eliminated the immunity from attack which darkness had conferred on them; and their weakness in face of air patrols of adequate strength could only be overcome by some means which would obviate the necessity of their coming to the surface at all.

This means was found in the "Schnorkel," which, by enabling the Diesel engine to be run without the boat coming to the surface, indefinitely extends the submerged endurance. It may do this in one of two ways: either the Diesel engine may be used for propelling the boat when running submerged, drawing its air supply and discharging its exhaust gases through the Schnorkel, or else the electric motors may still be used as hitherto for submerged running, the Diesel engine being used whenever necessary for recharging the batteries so exhausted. It is not possible to determine which method is actually used without a more detailed knowledge of the Schnorkel as actually fitted than has been made public; but the result is the same in either case, for it would appear that the Schnorkel is very inconspicuous and difficult to detect either from a ship or from the air.

This device, it would thus seem, is a fairly complete antidote from the U-boat's point of view to the "air menace"; but it is no antidote whatever to the asdic menace. The U-boat which remains submerged for long periods is just as liable to detection by the asdic as before, but inasmuch as U-boat losses were heaviest as the result of collaboration between the ships and aircraft, the elimination of one of those enemies must clearly work to the U-boat's advantage. Moreover, the power of moving submerged continuously has, accord-

ing to official announcements, enabled U-boats to reach some areas hitherto practically denied to them; it may well be that in such areas they have devised tactics and methods which render their detection more difficult, and, if so, some of the increased losses of shipping may be due to that cause. But it must be remembered that a U-boat cannot make a successful attack on a convoy without disclosing her own presence, and she then becomes just as liable as ever to an asdic hunt and depth-charge counterattack. Thus, increased shipping losses should be reflected in increased destruction of U-boats, and moreover, the Schnorkel can do nothing to obviate the shortcomings of the U-boat in ocean attacks unless it is combined with some means of overcoming the second handicap mentioned above, the low submerged speed possessed hitherto by submarines.

The full legend speed of most submarines is given in books of reference at seven to eight knots, though some of them go as high as ten. But such speeds can only be reached for short bursts, because of the limited capacity of the electric battery. The normal operating submerged speed may be taken as some four to five knots, and it is this limitation which has enabled convoys provided with adequate surface and air escorts to be given very complete protection against U-boat attack in the open ocean. When U-boats threatening attack have been located from the air they could be attacked and compelled to dive, while the convoy was diverted away from their position. So long as they could be kept submerged they could never overtake the convoy to gain a position for attack. That they could only do by surfacing again so as to use their high surface speed, which at once exposed them again to observation from the air and prompt counterattack. But if they could be endowed with a submerged speed of the order of some fourteen knots, they would be able to employ without coming to the surface something like the "wolf-pack" tactics which proved so effective up to 1943. It might be expected, therefore, that the enemy, in his search for "new types and new devices," would endeavor to evolve a U-boat with a high submerged speed and endurance. It is possible that the Schnorkel would assist towards this aim. One of the difficulties hitherto of the submarine designer has been that the hull form best suited to surface speed and seaworthiness is not the best for high submerged speed, and consequently every submarine has been a compromise between the two conflicting sets of requirements. But the submarine which does not require to come to the surface can be designed solely with a view to submerged operation. It would not be surprising if some of the recent developments by the enemy have been along these lines. Such a development would cause a recrudescence of the heavy fighting that went on round ocean convoys, as well as in narrow waters; but once again it must be remembered that, in these circumstances, too, a successful attack inevitably reveals the position of the attacker and equally inevitably provokes immediate counterattack, provided the convoy is furnished, as all Allied convoys are today, with an adequate escort.

This brief survey does not, of course, in any way exhaust the lines of development that may have been pursued by the enemy. There is doubtless hard fighting ahead; but there is no prospect of the U-boat regaining its lost ascendancy.

Training of Red Army Officers

Digested at the Command and General Staff School from an article by Lieutenant General Basili Morozov in *Information Bulletin* (Washington Embassy of USSR) 3 March 1945.

FOLLOWING are the various types of schools and colleges maintained by the Red Army for the training of its officers:

1. Officers Training School for subalterns (platoon commanders) [first commissioned rank, which is one rank below our 2d lieu-

tenant]—the largest section of officers on the Red Army rolls—and junior technical specialists for all arms of the services.

The Officers Training School draws its students from the ranks: noncommissioned officers and men who have served at the front and who are in good physical condition, who have been graduated from a secondary school (or, in exceptional cases, a seven-year school), and who have good service records. Many are soldiers who have already been decorated.

The length of the courses depends upon the nature of the school. The students have a difficult schedule—nine hours in class daily, plus two hours of independent study under the guidance of an instructor. The curriculum is designed to turn out loyal and disciplined officers who will make the highest demands upon themselves and their subordinates; who are determined, persistent, courageous, and capable of initiative; officers who can command a platoon under all the conditions of modern warfare, who know all weapons of the platoon and are themselves able to use them; who have mastered the technique and tactics of fighting at close quarters; who are capable of training noncommissioned officers and men; and who, if necessary, can replace their company commander during a battle.

The greater part of the instruction is given in the field, or in specially equipped quarters; twenty-five percent of the training takes place at night. Special attention is paid to the cooperation of all arms.

The best officer instructors available—men who have fought at the front in the present war—are selected. After completing the course, the students are placed on probation in the Army (the technical personnel go to factories), and take their final examinations only when their superiors have reported favorably upon them.

2. Special Military Schools under the People's Commissariat of Education, and Suvorov Cadet Schools.

The first type of school is for boys who have received exemplary reports on completion of their seventh year in the secondary schools. They are given three years' training in special military schools, as candidates for artillery, aviation, and naval colleges.

The Suvorov Cadet Schools were established during the present war to prepare boys for military service, giving them a complete secondary education and the training befitting an officer of the Red Army. In these schools the pupils are boarded, clothed, and maintained at State expense; they are sons of Red Army officers and men and of guerrillas, or orphans who lost their parents at the hands of the Germans.

3. Officers Refresher Courses and Officers Colleges.

These institutions provide additional training for captains and field officers. They are attended by officers who have had experience at the front and good records, and who have been marked for promotion, but require extra training in their particular branch of the service. Length of the course depends upon the officer's specialty. The study of the Red Army's operations in the present war is the central feature in these colleges and courses.

4. Military Academies and Higher Schools for Officers.

These are for the training of field and other high-ranking officers in all branches of military knowledge. The most outstanding officers are selected, who must be graduates of Officers Training Schools, have a full secondary or higher education, and exemplary records. Entrance to the academies is by competitive examination. Length of courses depends upon the nature of the academy. Instructors are drawn from the country's leading scientific workers in various fields of military knowledge, many of whom have received Stalin Prizes for notable work or inventions.

The aim of the academies is to develop higher-ranking officers who have not only a thorough knowledge of their professions, but also a very broad military, social, and political outlook. Considerable time is allotted to study of the history of warfare and the art of conducting operations.

In academies which train Army engineers, the students have a period of probation in factories. Officers of other schools serve their probation in the regular Army. Only when a candidate has successfully passed his final examinations, defended his thesis, and received a favorable report from the officer under whom he served his probation, is he considered a graduate of the academy. He then receives a diploma from the Committee on Higher Schools of the Council of People's Commissars.

Special attention is paid to the political training of Red Army officers, with the aim of developing officers of exemplary patriotism, ready without hesitation to give up their lives for their country.

The training of Red Army officers is not limited to schools and colleges. Officers are constantly perfecting their knowledge while on duty. They study the experience of the latest battles, and all new information pertaining to warfare. This study is well organized both at the front and in rear areas.

Campaign in Hungary

Digested at the Command and General Staff School from an article by Captain W. R. Young, MC, RA, in *The Fighting Forces* (Great Britain) February 1945.

THE invasion of Hungary was inevitable in two senses. For the Russians it was the logical sequel to the conquest of Rumania and a necessary part of the main strategic aim of outflanking the German positions in Poland (see sketch). For the Germans it was inevitable in the literal sense of being unavoidable. For the eastern frontier of Hungary is quite indefensible and the southern frontier, east of the Danube, is not much better.

It is true that the invasion might have been postponed for months, perhaps indefinitely, had the Germans been able to block the western outlets from the Rumanian mountains, for this could have been done without great expenditure of manpower, and the Germans would then have disposed of ample forces for the guarding of the hundred miles or so of southern frontier and—what is more important—they could have established a strong central reserve of mobile formations which could have been rapidly concentrated against the more dangerous invasion threats. But the course of events, not uninfluenced by the Russian armies, precluded this solution of the Germans' difficulties.

It happened that the Vienna award had so drawn the new frontier line in Transylvania that it was Rumanian and not Hungarian troops which held the passes leading northward from Wallachia. It also happened that, by the time the need to defend Hungary arose, the Rumanian army was already enrolled on the Allied side, and the German divisions, which might have retired on to the passes from southern and eastern Rumania, had been virtually annihilated. The result was that, before any forces could be sent from Hungary into Rumanian territory, Soviet troops were already over the Transylvanian Alps and had established bridgeheads across the River Maros. And the southeastern approach to Hungary lay open.

Thenceforward there was seen a noteworthy example of "distracting" strategy, for the Russian advances threatened a multitude of alternative objectives and the Germans could neither repel them all by a switching of concentrations nor stop or delay them all by a policy of dispersion, i.e., by being strong enough everywhere for the negative object. And if this is especially true of the preliminary Transylvanian phase of the Hungarian campaign, it can also be traced in the operations in Hungary itself.

The main axes of the Russian movements were northwards and westwards; that is, along the two arms of a right angle. But as the columns progressed along the arms they kept shedding off detachments to form front to the inner flanks. Thus the frontage of advance in each direction was being continual-

ly widened, and the strategy, which started on divergent lines, soon took the more familiar form of converging movements.

Starting in the first week of September, Marshal Malinovsky had, by the 12th, crossed the Maros on a broad front. By the beginning

furthest west of the Russian advances at the date, are some 170 air miles apart, and there would seem to be little connection between them till it is realized that much of the intervening space had already been filled in by the fanning out of troops which had entered

of October, Soviet troops had flowed slowly but steadily along the valleys, westward to Timisoara and Arad, northwards towards Cluj. On 3 October they overflowed into Yugoslav territory north of Belgrade, thereby creating a threat to the southern frontier of Hungary, but on 6 October they burst into the Hungarian plain itself between Mako and Gyula and moved westward towards the River Tisza, northward towards Debreczen. The Transylvanian operations meanwhile were continuing, and so it came about that the Order of the Day of 11 October recorded the simultaneous capture by Malinovsky's armies of Cluj and Szeged. These towns, representing respectively the furthest north and the Hungary from the southeast on 6 October.

The filling-in process was continued when a force, composed mainly of Kuban Cossacks and tanks, captured Oradea Mare on 12 October, and went on to join Don Cossacks and tanks, pushing up from the south, in the storming of Debreczen on 20 October.

Meanwhile, the bulk of the divisions from Cluj had continued their northward march to the Ruthenian border, where a date had been arranged with General Petrov's 4th Ukrainian Army from beyond the Tatar Pass. By 25 October the whole of Transylvania had been cleared, the 2d and 4th Ukrainian Armies had linked up, and the right arm of

the "exterior lines" advance through Hungary was ready for action.

Nor was the left arm behind in its program for, from Szeged, it had pushed steadily on to reach Baja on the Danube on 21 October. Then it faced north, and the advance between the Danube and Tisza began.

Faced by steady pressure from the south and a swinging threat from the east, the German command adopted the dual policy which is traditional to a strategy of interior lines —to hold on one flank and strike on the other. For many reasons the locale they chose for their aggressive role was the northeastern corner of Hungary. The economic importance of Miskolc and Tokay may have influenced the German choice, but it can be explained on the purely military grounds that the area was comparatively mountainous and that the connection between Malinovsky's army in Hungary and Petrov's in Czechoslovakia was weak, so that gaps of considerable size tended to open up between them.

The choice may have been precipitated by the fact that it was in this area that the Russians on 22 October made the first attack which suggested a decisive aim—when, after the fall of Debreczen, they sent a formidable force of Cossacks and armored divisions to seize Nyiregyhaza. This looked like a "right hook," and the German counterstroke seems to have followed within two days. The Russians, weak in artillery and completely lacking in infantry, were driven out and, though they recaptured the town on 31 October, the Germans had, in the meantime, driven Petrov out of Cop (first captured on 29 October) and so had interposed a forty-five mile gap between the 2d and 4th Ukrainian Armies.

Cop was not regained by the Russians till 23 November, the day which also saw the fall of Tokay; so it may be said that the German actions in the northeast were successful in holding up Russian progress in that quarter for nearly a month. But no such success rewarded the efforts of the troops which were opposing the Russian advance between the Danube and Tisza. That advance was not rapid—from two to five miles a day—but it was continuous and had an inexorable air about it. By 4 November it had collected 10,500 prisoners.

On that date, moreover, the Russians had reached Cegled, only thirty-five miles southeast of Budapest, and subsequent advances brought them to Jaszbereny, thirty miles due east of the capital, on 15 November and to Hatvan, twenty-seven miles northeast, on 26 November, so that shadows from the north began once more to cloud the German outlook.

To the south, however, the view was not discouraging, for more than a hundred miles of the Danube, from Budapest to the confluence of the Drava, seemed to provide an excellent natural defense line facing east, and this suggested an alternative strategy.

The situation, however, was completely transformed when Marshal Tolbukhin forced the Danube just south of the Hungarian border and pushed twenty-five miles westward to capture Pecs, and twenty-five miles northward along the right bank of the river.

By 2 December his 3d Ukrainian Army had taken Kaposvar within twenty-five miles of Lake Balaton, and Paks some fifty-five miles from Budapest; on 3 December he had advanced another twelve miles up the Danube; by the 6th he had reached the southern end of Lake Balaton and had also closed up a further fifteen miles towards Budapest; by the 7th he had established his left flank along the shore of the lake and was driving up a narrowing corridor towards the capital.

That it was a narrowing corridor was due to the fact that the German command had established a switch-line blocking the fifty-mile gap between Budapest and Lake Balaton, and this line Tolbukhin could not, for the moment, pierce.

During these developments the 2d Ukrainian Army had not been idle, for its laggard right wing had moved up to take Eger on 30 November and Miskolc on 3 December. But these successes could not have taken the eyes of the Germans off the threat from the southwest.

It is probable, then, that Marshal Malinovsky sprang a considerable surprise on them when, on 9 December, he launched a great double offensive on both sides of Budapest.

To the north he extended the frontage of his attack to the Czechoslovak border, outflanking the Danube line north of the bend and heading for the River Ipoly; to the south he crossed the Danube and linked up with Tolbukhin's troops on the western bank. But the Germans seem to have quickly readjusted their dispositions for we hear no more for some time of the new threat from the north. Malinovsky turned his attention once more to his right wing and brought it forward to the Czechoslovak border northwest of Miskolc.

The next move in the main battle was again to come from the southwest.

On Christmas Eve, Tolbukhin burst through the switch-line between Lake Balaton and the capital, captured the town of Szekesfejervar and fought his way north to cut the railway running west from Budapest at Bicske. At the same time, he closed directly on the city and his troops were fighting for the suburban railway stations on Christmas Day. On 26 December, Tolbukhin's left wing had reached the Danube at Esztergam and the ring round Budapest was complete.

It is to be noted that this is the first example of a decisive stroke to be found in the narrative of the Hungarian campaign, and it must be conceded that the Germans had conducted their operations up till Christmas time with considerable efficiency. Assailed by a numerically superior foe in country which provides ample space for the deployment of forces and for maneuver, the Germans had had to retreat continually. But that their retreats were not precipitate is shown by the generally slow progress of the Russian advance; that they were not unduly delayed is shown by the tale of prisoners lost. In the first month of the campaign, from 6 October to 6 November, the German and Hungarian losses were 100,000 killed and only 42,000 captured, and it must be remembered that the prisoners included a large proportion of Hungarian deserters.

For the Russians, the campaign has had fruitful results both directly and indirectly, but it would be interesting to know whether they have not found it rather dull after the brilliant achievements which have been recorded in other parts of the Eastern Front. Tolbukhin's two strokes undoubtedly provide the highlights of the Hungarian picture, and the second one, as has been already stated, must rank as a decisive one. A force of over nine divisions was trapped in Budapest.

Tank Operations at River Lines

Translated and digested at the Command and General Staff School from a Russian article by Lieutenant Colonel B. Slesarev in *Krasnaia Zvezda* (Red Star) 26 September 1944.

ATTACK and pursuit call for the crossing of numerous rivers and streams, which is especially difficult in the case of rivers the banks of which are fortified by the enemy. Small rivers are numerous and often slow up the tanks to a greater extent than do large ones, for large rivers are few and far between and the organization of crossing operations is planned far in advance. Tank units have no adequate river-crossing equipment, and frequently cross small rivers using the simplest devices. The more rivers are encountered, the slower becomes the progress of the tanks. Hence the conclusion: in order to attain a rapid tempo of advance, tanks should be supplied, always and everywhere, with the necessary crossing equipment to last through the entire operation.

Of great importance in this connection is the selection of the position of departure for the attacking tanks. Experience teaches that tanks should never attack from our side of the river if the opposite side is held by the enemy, no matter how small the river may appear. The thing to do is to occupy both sides of the river before the beginning of the attack and to concentrate our tanks on the enemy's side. This enables us to utilize the mobility and striking power of the tanks, so indispensable during the initial stage of the at-

tack. A situation where the next water line to be crossed is located beyond the tactical zone of the hostile defenses may be considered ideal. When the defenses are breached, the tanks reach the new water course and force a crossing from the march formation before the retreating enemy units have organized their defense. The pause between the occupation of the position of departure and the beginning of the attack should be brief, for if it is not, the enemy can locate the concentration of our tanks. What, then, should our tanks do after they break through the tactical zone of the hostile defenses and encounter small rivers defended by the enemy? Let us analyze two typical methods of overcoming these obstacles.

During the encirclement of the Bobruisk enemy group, the tank unit of Major General Panov had to operate in swampy and wooded terrain traversed by numerous rivers and streams. The N-th Regiment marched ahead of the main body. On the very first day of the attack, the regiment was to cut an important railroad and two highways, thereby forming one half of the pincers to encircle the enemy.

A cursory examination of the map made it clear to the commander how difficult this task was. The shortest possible route was about fifty or sixty kilometers, but on this route there were five small rivers with marshy banks. The crossing of each river would take, under the most favorable circumstances, not less than two or three hours. It was known that the enemy had either destroyed or had prepared to blow up most of the bridges over these rivers. It was obvious that the successive crossing of all the rivers would not do because of the limited time available for the operation.

After a careful study of the map, the commander of the tank unit selected another route. It followed a zigzagging course which was longer than the first but which nevertheless offered a number of advantages. The tanks would bypass three of the small rivers and some large peat works with their complex drainage system. As a result, the unit easily covered more than two-thirds of the route and found itself deep in the rear area of the enemy. The appearance of our tanks near the fourth river barring the way to the railroad was so unexpected that the Germans did not even blow up the bridge across the river.

The tanks went across, broke into a village, and then cut the railroad. Without halting, they struck northward. At the last river the enemy had destroyed the bridge and tried to stop the attackers. But this had been anticipated by our tankmen. They found a ford and soon invested both highways, thus completing their difficult mission ahead of schedule.

The above analysis shows that skilful overcoming of rivers by tanks was one of the essential conditions for the rapid encirclement of the Bobruisk enemy group. The tanks tried to bypass small rivers, which were really solid links of the German defenses. When this method could not be used or when it required too much time, the tanks forced the crossings.

The method of bypassing streams can be used only when the distance to the headwaters does not exceed fifteen or twenty kilometers. When the detour is longer, it is advisable to force the crossings and lay emergency bridges wherever necessary.

For a tactical analysis of this method, let us examine the operations of another tank unit. It had pierced a certain German position at several points at the same time and had rushed westward. The enemy, not being able to contain the concentrated tank blows, was losing one terrain line after another. While pursuing the enemy, our tanks crossed a river using fords and a restored bridge, advanced forty-five more kilometers, and finally reached another river. At two points, small groups of tanks and motorized infantry succeeded in establishing bridgeheads on the western bank of the river.

To the northern bridgehead the enemy brought some artillery, mortars, and tanks and blocked it all around. Using a hastily erected emergency bridge only a few Soviet tanks managed to get across. This was obviously insufficient for the rapid expansion of the bridgehead. The engagement developed

slowly, and finally became a duel between our tanks and the enemy.

Things were different at the southern bridgehead. Here the approaches to the river were more favorable, and the woods near the road on the western bank were occupied by our troops. As a result, the enemy could not do much to prevent our crossing the river. Part of our artillery crossed the river over the bridge hastily built by our sappers and, in cooperation with the motorized infantry, repelled several German counterattacks. Here the concentration of tanks in the position of departure proceeded according to plan.

At dusk it became evident that the widening of the northern bridgehead would not pay. It was decided, therefore, to transfer the northern tank group under the cover of darkness to the southern crossing. This was done at dawn, rapidly and efficiently. Then both tank groups overcame the enemy defenses by a sudden attack and resumed their advance along two diverging routes.

Now we can formulate a few general rules. When tanks fight their way across a water barrier, much depends on the rapidity of their action and, more particularly, on how quickly they can establish a bridgehead on the opposite bank and concentrate in their positions of departure. As a rule, the capture of a good bridgehead is the most important phase of the operation.

In order to win this first phase of the struggle for a river line, the tank troops should not only reach the water line unexpectedly for the enemy but also deceive him as to the actual place of crossing. This is attained by the simultaneous appearance of tanks on the river line on a broad front, which is about as wide as the zone of action of the attacking unit. Sometimes the width of the front may be even larger, especially when the bank has stretches where crossing is impossible.

Preparations for the crossing should start at several points simultaneously. This produces a dispersion of enemy fire means. When hostile fire means are not numerous and bridges or fords are available at several points, the crossing should start at all points simultaneously. There should be no delay in bringing the tanks to the crossing, so that the whole operation can be completed literally within a few minutes.

It may happen that one of the crossing points is completed long before the rest of the crossings. Since the enemy is likely to bring artillery fire on the area where the tanks are concentrated or bomb it from the air, all the tanks should be brought to the completed crossing point and cross over as soon as possible.

Who is supposed to establish bridgeheads for successive tank blows? Experience shows that this should be done by motorized infantry and should be supported by artillery and tank fires. The entire area should be well protected by antiaircraft artillery and aerial patrols.

As for the place of antiaircraft weapons and sapper equipment in the marching tank column, inasmuch as these are needed as soon as the column reaches the water line it is most advantageous to keep them near the head of the column and avoid their dispersion. It is a serious error to have these elements march in the rear of the column. This usually results in loss of time and affects the entire maneuver.

Detailed study of the terrain and of the enemy fire system in each case will enable the commander to select the most effective method of crossing. It is of utmost importance that the plan for crossing a river be prepared well in advance and be based upon accurate terrain data, for no improvisation in such matters can be tolerated.

Speed in the Air

An article in *Aircraft Recognition* (Great Britain) February 1945.

NEW and varied are the problems brought about by air speeds in military aircraft which are now—at the fastest—nearly double those which were general when the war began. The peacetime world's speed record is now left far behind and still higher "supersonic" speeds are within sight.

In the early part of 1945 the three fastest aircraft in active service, of which details have been made known, are:

1. Messerschmitt Me 163B—about 600 miles per hour.

2. Messerschmitt Me 262—about 500 miles per hour.

3. North American Mustang—more than 450 miles per hour.

It is a list which may change almost from day to day as more power is persuaded out of existing engines and new aerodynamic refinements are introduced. And the speeds of all winged aircraft are far exceeded by the 3,000 miles per hour of the German V-2 rocket.

A speed of 400 miles per hour means that 293 feet are covered in half a second. At 600 miles per hour an airplane flies 440 feet in half a second. When the machine is flying in a straight line the speed itself has no physical effect on a pilot. But when he begins to turn, things start to happen.

For instance, at 200 miles per hour a turn which will impose on the pilot a force of five G will have a radius of 534 feet. This force of five G means that each particle of the pilot, and of the airplane itself, is submitted to an acceleration force equal to five times its weight. It is about the maximum which can be sustained uncomfortably without suffering in efficiency.

At 400 miles per hour the same five G turn requires a radius of 2,136 feet—twice the speed but four times the radius. At 600 miles per hour the radius will be 4,806 feet. So we see that the complete turn of 360 degrees will take the 200-miles-per-hour airplane eleven and a half seconds to complete and the 600-miles-per-hour airplane three times as long because the 600-miles-per-hour airplane will describe a circle which has nine times the diameter of that of the 200-miles-per-hour airplane, the force in the turn being the same.

If the pilot of the fast airplane tries to pull the turn tighter to get around more quickly, he will probably achieve two things:

1. He will "blackout" (at about seven G).

2. He will precipitate a "high-speed stall."

Indeed, a 600-miles-per-hour airplane could complete a turn of 360 degrees in eleven and a half seconds only by applying a force of about fifteen G which would in any case suffocate the pilot, displace his internal economy, and probably break the airplane. Fortunately he will not be likely to force his liver through his seat by such violent maneuvers because of the "high-speed stall."

The high-speed stall occurs when the effective wing loading increases beyond the point at which the wing stalls at the indicated air speed and, consequently, angle of attack at which the turn is being made.

For instance, if a 400-miles-per-hour airplane weighs 10,000 pounds and has 250 square feet of wing area, its normal wing loading will be forty pounds per square foot. But in a six G turn the effective weight will increase from 10,000 pounds to 60,000 pounds, so that the wing loading will increase to 240 pounds per square foot. The wing of such an airplane will stall if the turn is tighter than about 950 feet radius which would require 10.2 seconds to complete the 360-degree circle—at 11.2 G.

That is one reason for the Youngman area-increasing flaps on the Firefly. They increase both the lift and the area of the wing at the same time and hence make possible tighter turns at slower speeds without stalling.

Generalizing, one can say that for any definite and limited application of G in a

turn, the faster the airplane the greater the radius of turn and the longer the time to complete a 360-degree circuit. Nevertheless, speed is essential to give the initiative in combat.

In wartime, perhaps the most important aspect of speed is its effect on shooting, both from the point of view of the attacker and the attacked.

The defensive gunner in a bomber has to "aim off" by calculated amounts to give enough "lead" to hit a fighter which is approaching from an angle. Otherwise, the fighter will have flown out of the path of the bullets by the time they reach the range at which the target was flying when the bullets were fired at it. Obviously, the faster the speed of the target the more the deflection. A further point is that, when the rate of fire of the gun is low, a fighter may fly between two missiles. For instance, if a rate of fire of a cannon is 600 rounds per minute, the gap between shells is one-tenth of a second. In that time a 600-miles-per-hour fighter will have moved forward 88 feet. So if the target was flying so that its relative velocity to the gun was the full 600 miles per hour and the first shell passed just in front of the nose, the second shell would be well behind the tail.

Hence the need for guns of high muzzle velocity and rapid rate of fire in shooting at high-speed fighters.

As speed increases so the time which the fighter pilot has available to align his own sights is reduced. Deflection shooting becomes increasingly difficult. That is an additional reason why the German jet types have so far avoided "mixing it" in dog fights and prefer to attack bomber targets either tail-on or head-on where there is little or no deflection. Even so, fast-firing cannon of high muzzle velocity are an advantage. So the use of the relatively slow-firing 30-mm MK 108 cannon by the German jet types is rather surprising. Probably the enemy has decided that the increased weight of armor of modern Allied bombers demands a heavy shell to cause the maximum effect with the minimum of hits.

On the Allied side the tendency in high-speed fighters is to concentrate on four 20-mm cannon which combine a fairly high rate of fire (800 rounds per minute) with high muzzle velocity and a powerful punch per shell. However, the six .50-caliber machine guns of the Mustang and the eight .50-caliber guns of the Thunderbolt are exceedingly formidable and, for snap shooting, possibly preferable to cannon in that more hits per second are possible.

As speeds increase still further, fresh problems of aerodynamics, of tactics, and of armament will appear. We are on the eve of developments the full extent of which can be but dimly seen.

Division Services in Pursuit Operations

Translated and digested at the Command and General Staff School from a Russian article (editorial) in *Krasnaia Zvezda* (Red Star) 1 October 1944.

SKILFUL control of supply during the breakthrough period and at the beginning of pursuit determines, to a large extent, the initial development of the offensive. If a well-functioning supply organization is maintained during the entire period of pursuit, the success of the operation is assured. The units charged with pursuit will have sufficient ammunition, fuel, and other supplies. They will be able to inflict new blows upon the enemy without a pause in the pursuit, and will deprive him completely of the ability to offer organized resistance.

With the beginning of forward movement, the division services are confronted with two problems: how to displace forward all service units and installations, and how to supply the troops with ammunition, fuel, food, forage, etc. The accomplishment of these tasks depends upon how well the division transportation is organized, upon supply officers' skill in using the transportation

facilities, and upon the correct disposition of the personnel and equipment.

When retreating, the enemy destroys railroads, highways, and river crossings. All routes of supply from railheads are considerably lengthened. Motor transportation becomes extremely important. All army and division transportation facilities, therefore, should be used in accordance with a thoroughly prepared transportation plan.

Under no circumstances should the division supply points be farther than twenty or twenty-five kilometers from the troops, nor should the division be required, during the periods of fast forward movement, to pick up stocks of army depots, for it will never manage to transport these stocks to the regiments and to move its own stocks and installations forward.

Army must take all necessary measures to help the division services and especially the division transportation units. When the troops are moving forward rapidly, the army uses its transportation facilities to supply the divisions.

What determines the efficiency of the services? First of all, a sober and clear understanding of the battle mission and of the situation. *The plan of the chief of services, furthermore, should be just as bold and daring as the plan of the battle, and the maneuvering of the supplies and of the transport should correspond to the tempo and skill in the maneuvering of the units.* And besides, all supply missions should be accomplished according to a definite plan based on a thorough knowledge of the mission and of the situation.

The officer in charge of supply should constantly strive to have his stocks and equipment near by and see to it that his services do not stretch too far into the depth of our dispositions. All officers of the services should be able to feel the pulse of the battle and know the requirement of the troops at any given moment. They will know then what items are to be sent forward first, in what direction, and in what quantities. They should remember that supplies must be distributed not mechanically but in accordance with the plan of the battle, for this will help the troops accomplish their mission.

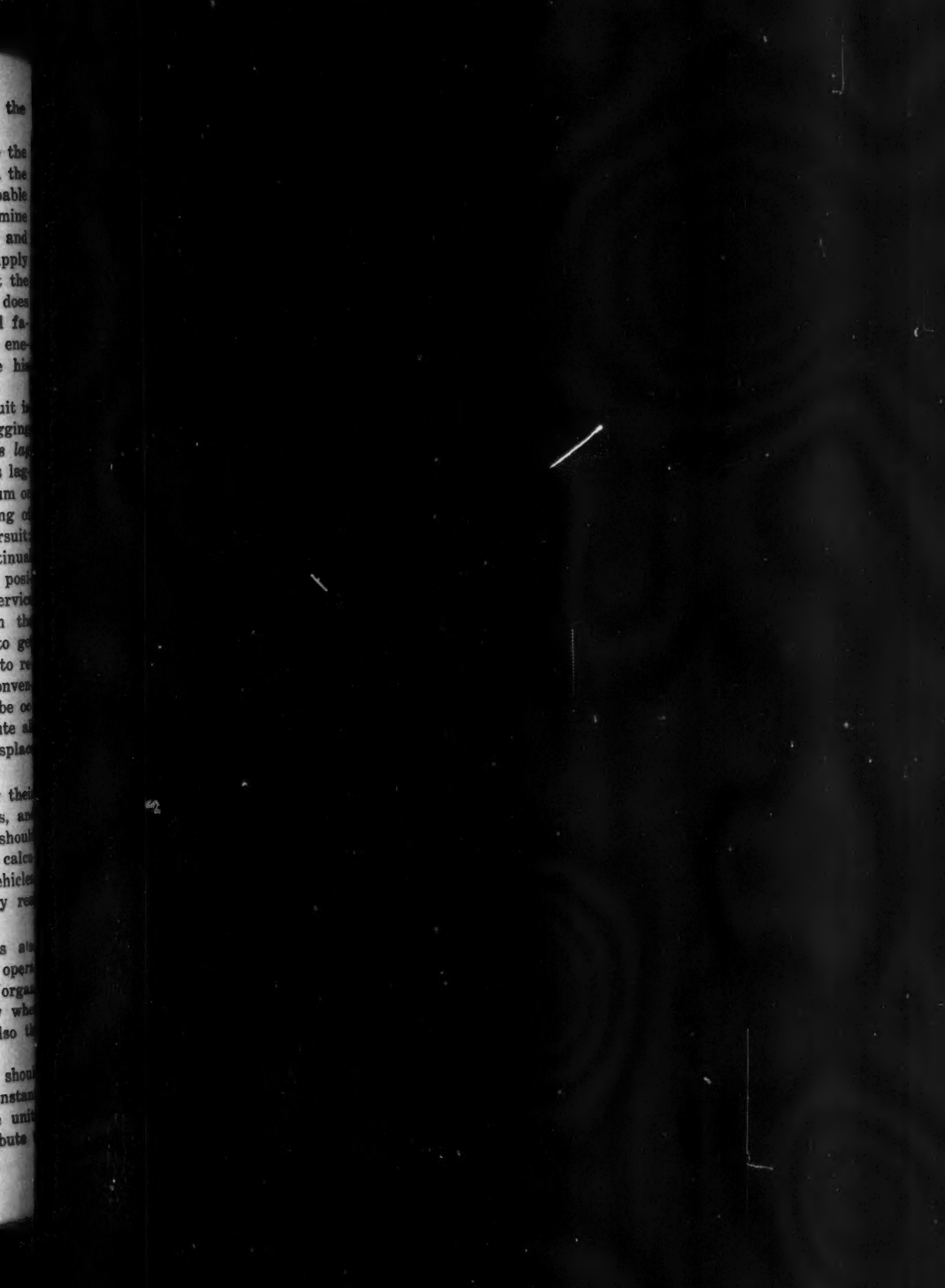
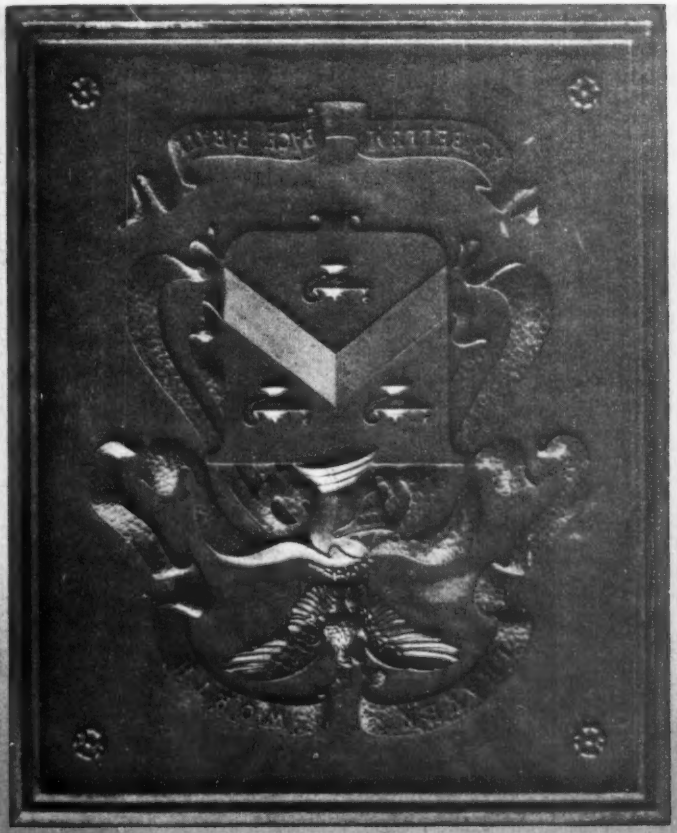
During the approach of the troops to the first terrain line fortified by the enemy, the supply officer should plan for a probable counterattack. He should try to determine the extent and the scale of this action and take care of all necessary items of supply so that the troops will receive them at the proper time. Even if the counterattack does not materialize, these preparations will facilitate our further advance before the enemy has had enough time to organize his defenses.

The belief that a fast tempo of pursuit is the principal cause of the services lagging behind is erroneous. *When the services lag behind, their work lacks planning.* This lagging behind can be reduced to a minimum or entirely eliminated by a skilful planning of supply work for different types of pursuit: in march columns, pursuit with continual fighting, or action against successive positions of the retreating enemy. All service officers should actively participate in the supply work; they should know how to get oriented quickly in any situation, how to reconnoiter roads, how to select most convenient routes, how to study the sites to be occupied by the services, how to distribute all units and installations correctly and displace all service elements efficiently.

All service officers should also know their transportation units, their possibilities, and the weight of prescribed loads; they should be able to make quickly all necessary calculations in loading and unloading vehicles. Without all this there cannot be any real efficiency in the work of the services.

Protection of rear installations is also very important, especially in pursuit operations. All-around defense should be organized during all halts. March security when following the advancing troops is also the responsibility of the supply officers.

All officers and all supply personnel should constantly perfect our methods and constantly improve the work of the service units. This in no small degree will contribute to the complete defeat of the enemy.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